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J J Gilmour Esq

ON THE

THEORY AND PRACTICE

OF

MIDWIFERY.

69

544

BY

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"THINE IS A HIGH AND HOLY OFFICE; SEE THAT THOU EXERCISE IT PURELY; NOT FOR THINE OWN ADVANCEMENT, NOT FOR THINE OWN HONOUR, BUT FOR THE GLORY OF GOD AND THE GOOD OF THY NEIGHBOUR. HEREAFTER THOU WILT HAVE TO GIVE AN ACCOUNT OF IT."—*Hufeland.*

BRITISH MEDICAL ASSOCIATION

TO

CHARLES JOHNSON, Esq., M.D.,

AND

ALFRED H. McCLINTOCK, Esq., M.D.,

EX-MASTERS OF THE LYING-IN HOSPITAL, DUBLIN,

THIS VOLUME

Is Dedicated,

BY THEIR ATTACHED FRIEND.

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PREFACE.

I HAVE very carefully revised this Edition in preparing it for the press, and I trust the number of errors will be found to have diminished, and I have, I hope, brought it up to the present state of our knowledge.

I have added to the statistics all within my reach, and so far have improved them, for although the deductions from numbers will never be more than an approximation to the truth, yet the larger the numbers the nearer will be that approximation.

I have endeavoured in this Edition to affix the name of the authors from whom the woodcuts are taken, but from the lapse of time there may be some inaccuracies, and for any such I must only apologize. Dr. F. Ramsbotham has been kind enough to point out those to which he is entitled, and I have affixed his name to them.

The years that have passed since the First Edition ought to have corrected many hasty conclusions, tested some doubtful ones, and confirmed the sound ones. In some hope that this has been the case, I have ventured to state more positively, though I trust not dogmatically, the opinions I have formed, and the line of practice I have followed and would recommend.

Once more—it may be for the last time—I would express my warmest gratitude to those friends who have received this work so kindly, who have borne so patiently with its imperfections, and who have so kindly aided me in correcting them. No man ever had more cause for thankfulness to God and to his friends than I have.

15, *Stephen's Green, Dublin,*
Easter, 1866.

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ON

THE THEORY AND PRACTICE

OF

MIDWIFERY.

PRELIMINARY OBSERVATIONS.

THE theory and practice of Midwifery embraces the anatomy and physiology of the organs of generation, and also the anatomy of the regions in which they are contained.

A correct knowledge of the structure, magnitude, and other peculiarities of the pelvic cavity is indispensable to a due appreciation of the mechanism of parturition: the anatomy of the organs of generation must of course be preliminary to an investigation into their physiology, and it is only by a minute and accurate observation of their functions that we are able to detect and comprehend the deviations from their course; in other words, their pathology.

The four great functions of the uterine system are *menstruation*, *conception*, *gestation*, and *parturition*, which are so intimately connected, that each is dependent on the other; and for the development of either, the co-operation of several organs is necessary. A breach of this union, or the absence of this co-operation, will involve functional irregularity or inefficiency; and together with the deviations of individual organs from the normal standard, and certain organic deficiencies, will constitute the pathology of the female generative system.

We have thus, in a few words, a natural arrangement of subjects laid down, which I shall follow in the subsequent parts of this volume.

Part I. will include the normal and abnormal anatomy of the pelvis, and of the external and internal organs of generation.

Part II., the function of menstruation, and of conception, utero-gestation, ovology, &c., with their abnormal deviations, as sterility, superfœtation, extra-uterine gestation, fœtal pathology, abortion, &c.

Part III., Midwifery properly so called, that is, parturition, with its abnormal varieties.

This arrangement will bring under our notice all that relates to the theory and practice of midwifery. In addition to the description of the various functions mentioned above, there will be given full details for their management, and for the treatment of their deviations; all of which I shall endeavour to state as clearly and concisely as possible.

PART I.

THE ANATOMY OF THE PELVIS AND OF THE ORGANS OF GENERATION.

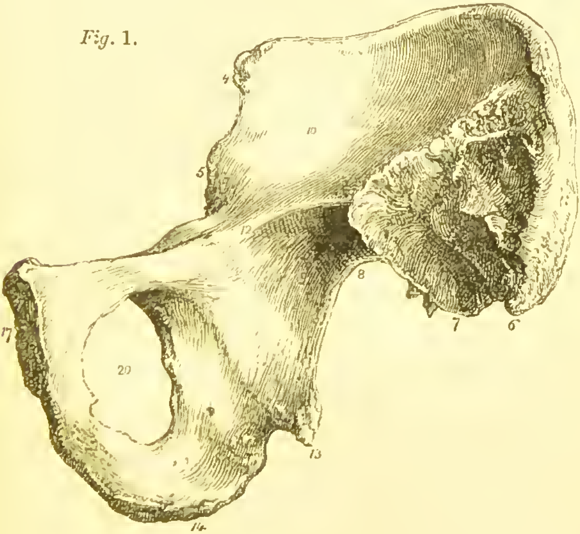
CHAPTER I.

OF THE BONES OF THE PELVIS.

The pelvis is an irregular bony cavity, situated at the base of the spinal column, and above the inferior extremities, with which it is connected by articulations and muscles, and for which, as well as for the muscles of the trunk, it constitutes a "*point d'appui.*"

As it forms one of the two mechanical elements of parturition, it is of great consequence to understand rightly its component parts their connexions, relations, coverings, and abnormal varieties. These we shall therefore proceed to investigate at once.

Fig. 1.



(*From Maygrier.*)

In the adult, the pelvis may be divided into four parts or bones; viz., two *ossa innominata*, the *os sacrum*, and the *os coccygis;* but in early life they are more minutely divisible. Let us now examine these bones separately.

Each Os INNOMINATUM, at an early period of intra-uterine life, consists of cartilage only, in which, subsequently, numerous spiculæ of ossification are seen, and which at birth have coalesced so as to form three bones, separated by cartilage.

After birth, the process of ossification continues until these separate bones meet in the acetabulum, where they are identified with each other, and at the symphysis pubis, where the opposite ossa pubis are united by cartilage and ligaments. The breadth of each os innominatum, from the anterior-superior to the posterior-superior spinous process, is six inches, and the height from the tuber ischii to the highest part of the crest of the ilium is seven inches.

The three bones into which each os innominatum is divided at birth have received different names, and require a distinct notice.

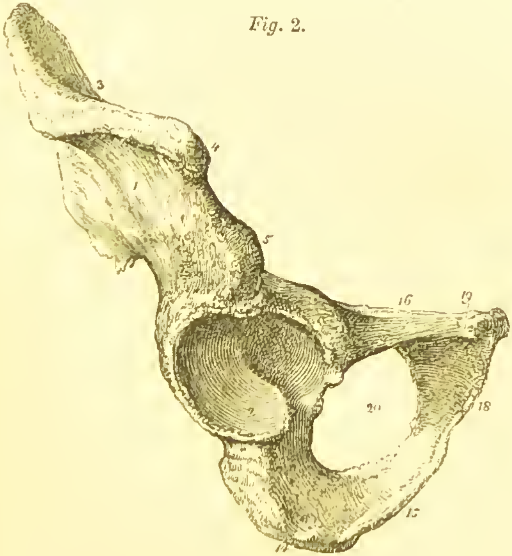
The Os ILIUM, *hip, or haunch-bone* (figs. 1, 2) is the larger of the three, of a triangular shape, situated superiorly, and with its fellow forming what is called the false pelvis.

Its *external* surface (1), or *dorsum*, is convex, irregular, with elevations and depressions which serve for the attachment of the glutæi muscles. Its *internal* surface, or *venter* (10), is concave and smooth, affording a bed for the iliacus internus muscle. The *lower* portion, body or base (5), is the thickest part of the bone, and forms more than one-third of the acetabulum. Above the body, the bone spreads out into its *ala* or wing, which rises obliquely forwards, upwards, outwards, and then backwards, terminating in the crest or *crista ilii*—a semicircular ridge of some thickness, which, at its posterior part, curves downwards and forwards. Its borders serve for the attachment of the abdominal muscles, and certain ligaments to be hereafter described; and it terminates anteriorly, in the anterior-superior, and anterior-inferior spinous process (4 5). The former affords attachment to Poupart's ligament, the tensor vaginæ femoris, the sartorius, and a portion of the rectus femoris muscles. Between the posterior spinous processes is a deep arch,—the *sciatic notch*—which is divided by ligaments into the two sciatic foramina: through the upper of these, which is the larger, pass the gluteal, sciatic, and pudic arteries, the sciatic and pudic nerves, and the pyriform muscle; whilst, through the inferior opening, the pudic arteries and nerve re-enter the pelvis, and the obturator internus muscle passes out. The posterior part of the crest of the ilium terminates in an irregularly oval rough surface, with numerous prominences, which occupy corresponding depressions in the sacrum, and constitute (with a thin layer of cartilage interposed) the *sacro-iliac synchondrosis* of each side. The body of the bone is divided from the ala internally by a well-marked ridge (12), running from the junction of the ilium with the sacrum, forward; this is part of the *linea ilio-pectinea,* and defines the boundary of the true pelvis.

Thus we find that the ilium is connected posteriorly with the sacrum, and identified anteriorly with the ischium and pubis in the acetabulum.

The Os Ischium, *os sedentarium,* &c. is the lower of the three bones composing the os innominatum, and the next in size to the os ilium. Its base or body (2), which forms the inferior portion of the acetabulum, is the thickest part; below this we find a narrower portion, from which a spinous process juts out backwards and inwards, and affords insertion to part of the sacro-sciatic ligament.

Fig. 2.



(*From Maygrier.*)

This process varies in length and direction, and is occasionally of some importance obstetrically. From the neck, the bone descends downwards and forwards, until, enlarging at its lower portion, it forms the *tuber ischii* (14), the bony seat, a rough, thick protuberance; and turning upwards, at an obtuse angle, becomes the *ascending ramus* (15) of the ischium. Its *internal* surface is smooth and even, and forms one of the *inclined planes* of the pelvic cavity. Its *external* surface is rough, and gives attachment to the sacro-sciatic ligament, to the semi-membranosus, semi-tendinosus, the long head of the biceps flexor cruris, and the quadratus femoris muscles.

Thus the ischium is identified with the ilium and pubis in the acetabulum, with the descending ramus of the pubis, and is connected by ligament with the sacrum.

The Os Pubis, *pecten or share-bone,* is the smaller and most anterior of the three bones. Its *base* is the thickest part, and forms the anterior and smaller third of the acetabulum, beyond which the bone narrows; and, proceeding forwards, constitutes the *horizontal ramus* (16) of the pubis; somewhat triangular in shape, and about half an inch in breadth. It meets its opposite at the symphysis pubis (17), and completes the anterior wall of the pelvis. From the inferior part of the symphysis, and at an acute angle with the horizontal ramus, a thin plate of bone, the *descending ramus* (18), proceeds downwards to meet the ascending ramus of the ischium, and with it to form one side of the *arch of the pubis.* Upon the angle formed by these bones and their opposites will depend the dimensions of the arch, and the facility or difficulty of the transit of the child through the lower outlet.

The inner and superior edge of the horizontal ramus is a continuation of the linea ilio-pectinea, which it completes; and near its pubic termination is a small spinous process, to which is attached the inner end of Poupart's ligament, and near it the pectineus muscle, while the inner and outer edges of this portion of the bone afford insertions to the abdominal muscles. Although I have stated that the anterior part of the bony pelvis is completed by the ossa pubis and ischium, yet in the centre of each side a considerable space is left, called the *obturator foramen* (20), which is nearly closed by the obturator ligament. The object attained by this arrangement is lightness of structure where strength is not needed. The shape of these foramina is stated by Meckel, Cruveilhier, Cloquet, &c., to be oval in the male and triangular in the female. Other and opposite statements have been made, but from the observations of Dr. John Neill* there can be little doubt that the former opinion is the correct one, and this affords an additional distinction between the male and female skeleton. The os pubis is identified with the ilium and ischium in the acetabulum, with the ascending ramus of the ischium, and is connected with its fellow opposite by cartilage at the symphysis pubis.

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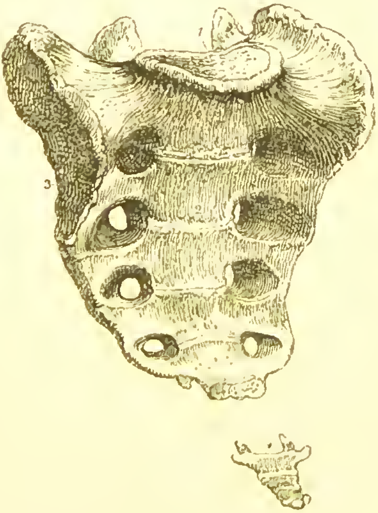
* Summary of Trans. of Coll. of Phys. Philadelphia, vol. iii., No. 2. Amer. Med. Jour., Oct. 1850, p. 558.

Of the three bones, the ilium forms a part of the brim and cavity of the pelvis, but none of the outlet; the ischium, part of the outlet and cavity, but none of the brim; whilst the ossa pubis enter into the formation of both brim and outlet.

The Os SACRUM, *os basilare*, &c. (fig. 3), terminates the vertebral column, and may be said to consist of several vertebræ anchylosed. Its formation commences by about thirty-five points of ossification, these shortly coalesce into fifteen; at birth the number is reduced to five (the number of vertebræ of which the bone consists), and subsequently they form but one bone. In the adult it is of a triangular shape, the base of the triangle being above, and inclining forwards; the apex below, and somewhat backwards. Its length is from four to four and a half inches, its breadth four inches, and its greatest thickness two and a half inches. M. Baudelocque found that the thickness of this bone scarcely varies a line, even in deformed pelves. Its specific gravity is small, owing to its spongy texture, so that for its size it is probably the

Fig. 3.



(*From Maygrier.*)

lightest bone in the body. Its *external* surface is rough and convex, exhibiting four or five *spinous processes* like those of the vertebræ, but smaller, and diminishing in size as they descend. Anterior to these we find a continuation of the *spinal canal*, containing the *cauda equina;* with four holes on each side communicating with it, for the transmission of nerves. Its *internal* surface (²) is smooth and concave to the amount of half an inch, crossed by four transverse lines, marking the former division of its bones by cartilage: here are also four pairs of holes sloping outwards, through which pass nervous filaments, which afterwards form part of the great sciatic nerve. The upper edge of this bone completes the brim of the pelvis; the oval shape of which, however, is broken by the projection of the central portion,—the *promontory of the sacrum* (¹). The lateral *surfaces* (³) are rough, uneven, and covered with a thin layer of cartilage; the irregularities correspond to similar ones in the ilium, and with them form the *sacro-iliac synchondroses*. This is probably the most important bone in the pelvis, obstetrically considered, inasmuch as it forms a great portion of the brim and cavity, and enters largely into the various deformities of the pelvis.

It is connected superiorly with the last lumbar vertebra, laterally with the ossa ilia, inferiorly with the os coccygis, and by ligaments with the ossa ischia.

The Os Coccygis, or *huckle-bone* (⁴), is the continuation and termination of the os sacrum and vertebral column. It is formed by four or five points of ossification in the fœtus, which do not afterwards unite, but are tipped with cartilage, and moveable by a ginglymoid joint. The entire bones form a pyramid, the apex of which is below. The *external* surface is irregular, and the *internal* smooth, terminating the plane of the sacrum, and extending it anteriorly. The small sciatic ligament and the ischio-coccygeal muscle are inserted into it.

To the accoucheur this apparently insignificant bone, or bones, is of importance, as any deviation from its normal direction or usual mobility, may influence the progress of parturition.

CHAPTER II.

OF THE JOINTS OF THE PELVIS.

Before proceeding to the consideration of the pelvis collectively, let us briefly examine the joints by which the separate bones are connected, and especially as deficient information on this subject has heretofore led to erroneous practical conclusions.

I shall notice, 1, the sacro-iliac synchondroses; 2, the symphysis pubis; and 3, the sacro-coccygeal joint.

The SACRO-ILIAC SYNCHONDROSIS, of either side, consists of a rough irregular surface on the posterior part of the ilium and the side of the sacrum, each of which is covered with a layer of cartilage from one-sixth to one-eighth of an inch in thickness; the sacral layer being the thicker, and the entire, when the bones are forcibly separated, adhering to the sacrum. At the point of junction of these two layers, their substance is somewhat softer, which has led to the erroneous supposition that it is a joint properly so called. This union of the bones is strengthened by strong ligamentous bands, which by some writers are described as the superior, inferior, anterior, and posterior sacro-iliac ligaments. They stretch across from one bone to the other in front and behind, rendering the joint perfectly immovable, unless great force be used. Additional strength also is obtained by the sacro-sciatic ligaments connecting the lower part of the sacrum with the ilium.

The mode in which the sacrum is inserted between the ossa ilia is worthy of notice; it resembles the position of the keystone of an arch *inverted*—*i. e.*, its transverse diameter is greater *inside* than *outside*, because the pressure which it has to resist is from within. The interposition of cartilage is probably for the purpose of diminishing the effect of shocks, and so preserving the integrity of the union.

The SYMPHYSIS PUBIS is situated anteriorly, and formed by the junction of the two ossa pubis, whose extremities are covered by cartilage or fibro-cartilage. It was formerly supposed that the junction was effected by the interposition of a single mass of cartilage; but the researches of Dr. W. Hunter led him to the conclusion that the end of each bone is covered with cartilage, and that between each so covered, there is a matter resembling the intervertebral substance. With this view, M. Baudelocque and Dr. Burns agree, but M. Tenon thinks that sometimes the one and sometimes the other mode obtains. Occupying two-thirds of the length, and the posterior third of the centre of this junction, we find a true arthrodial articulation, six lines in length and two in breadth, in shape like an almond, lined by synovial membrane, and containing a small quantity of synovia. M. Gardien defines this joint as "an arthrodial articulation in part, and the remainder a true synevrotic synchondrosis."*

Though the joint be weak in itself, it is strongly fortified by ligaments. The capsule is strong, and is connected with, or partly formed by, the anterior and posterior pubic and sub-pubic ligaments, which consist of interlacing fibres stretched across the joint on all sides, and firmly attached to each os pubis.

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* Traité des Accouchemens, vol. i., p. 28.

Ambrose Paré, Severin Pineau, and other ancient writers, with Sigault, Chaussier, Gardien, Matthews Duncan,* Laborie,† &c., among the moderns, judging from its occurrence in certain animals, have concluded that the ossa pubis are separated to a certain extent during labour, and that this joint is a special provision for increasing the antero-posterior diameter of the brim of the pelvis; and certain *post-mortem* examinations of females who died near the full term of gestation, have been adduced in proof of the fact. On the other hand this separation is denied, and I believe justly, by Denman, Baudelocque, Boyer, Burns, Dewees, &c. M. Baudelocque, and others, have sought for it in vain in cases where no violence has been used; and, from a fair examination of the observations on record, we may conclude that it never takes place as a natural process, but that we occasionally meet with it as an accident. Dr. Dewees'‡ arguments appear to me conclusive: "1. It is not stated to be more frequent in distorted than in well-formed pelves, which ought to be the case on account of the greater pressure. 2. When it does occur, it is attended with severe inconveniences, which are not observed after ordinary labour. 3. That such a separation as has been imagined, would not materially increase the antero-posterior diameter of the brim, as it would require the two ossa pubis to be separated one inch from each other to gain two lines."

I may add, that this separation can only be effected by the rupture of the pubic ligaments and sacro-iliac synchondroses, the structure of which proves, beyond doubt, that they were not intended to expand; and that when this accident does occur, it completely incapacitates the patient from moving about, by depriving the lower extremities of a firm "*point d'appui*," which, as M. Martin has shown,§ can only be restored by a band passed firmly around the pelvis, and pressing the sacro-iliac synchondroses strongly together.

The SACRO-COCCYGEAL joint is of the kind called ginglymoid, admitting of extensive motion, especially backwards, so as to permit the enlargement of the lower outlet, in its antero-posterior diameter, at least one inch. The articulating surfaces are covered with cartilage, and between them is a synovial capsule; whilst on the outside, and entirely embracing the joint, is a fibrous capsular ligament.

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* Dublin Journal, vol. xviii., p. 60.
† Gaz. Hebdom., 1862, No. 34.
‡ Compendious System of Midwifery, p. 13.
§ Gazette Médicale, Nov. 1851.

Abnormal deviations. Relaxation, or violent disruption of the *pubic joint* and *sacro-iliac synchondroses,* has been well described by Dr. Denman* and others. The most remarkable symptom is the difficulty or impossibility of sitting erect, of assuming an upright position without help, of standing or walking. There is often pain or uneasiness in the pelvic region, which may give rise to a suspicion of uterine disease; and a sense of weakness and looseness in the bones. Relief will be immediately afforded by a binder, which, by its tightness, shall supply the degree of firmness in which the pelvis is deficient; this and absolute rest are our chief remedies, and the former should be worn until a natural union takes place.

But a further evil may occur, as Dr. Denman has pointed out. Inflammation may take place in the injured joints, and matter be formed on their loosened surfaces. "When suppuration," he observes, "has taken place, in consequence of the injury sustained at the junction of the ossa innominata with the sacrum, the abscess has in some cases been formed near the part affected, and been cured by common treatment. But in others, where matter has been formed and confined at the symphysis of the ossa pubis, the symptoms of a hectic fever have been produced, and the cause has not been discovered till after the death of the patient. In others, the matter has burst through the capsular ligament of the symphysis at the inferior edge, or perhaps made its way into the bladder: and in others, it has insinuated itself under the periosteum, continuing its course till it arrived at the acetabulum. The mischief being thus extended, all the symptoms were aggravated; and the matter making its way to the surface, a large abscess has been formed on the inner and fore part of the thigh, or near the hip, and the patients being exhausted by the free and proper discharge, have at length yielded to their fate."† In all such cases, where it is possible, the abscess should be opened, and the matter evacuated.

The *sacro-coccygeal joint* may become anchylosed, and so offer a decided impediment to the dilatation of the lower outlet during labour, as we shall see by-and-by.

---

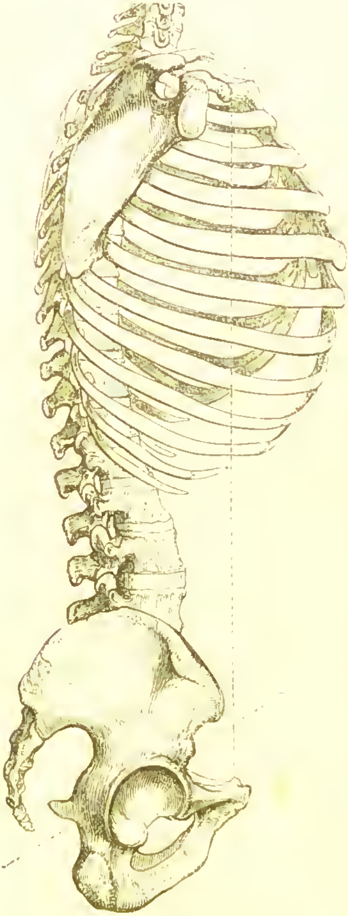
* Introduction to Midwifery, p. 17. 7th Ed.

† Ibid.

CHAPTER III.

OF THE PELVIS COLLECTIVELY.

Fig. 4.



(*From Dr. Ramsbotham.*)

Having thus examined each bone of the pelvis separately, and the joints by which they are united, our next object is, the consideration of the pelvis as a whole, in relation to the rest of the body, its magnitude, axes, &c.

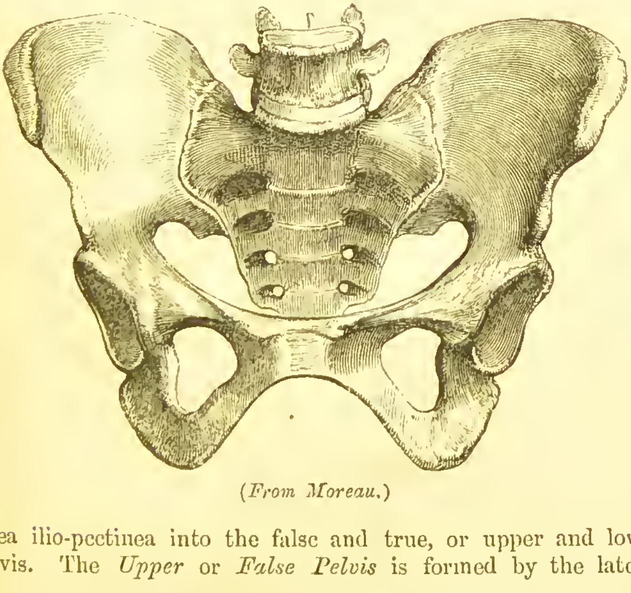
It is connected with the trunk by the articulation of the sacrum with the last lumbar vertebra, effected in the same manner as the junction of the vertebræ with each other: with the lower extremities, it is connected by means of the hip-joints.

But the *position* of the pelvis *in situ* is very different from what we might suppose from examining it separately. The brim of the pelvis is neither horizontal nor perpendicular, but oblique, but looking very decidedly forward. When the body is erect, the upper part of the sacrum and the acetabula are nearly in the same descending line. The obliquity has been variously estimated; that of the brim from 35° to 60°, and that of the outlet from $5\frac{1}{2}$° to 18°. Naegelè states the obliquity of the brim to be from 50° to 60°, and that of the outlet from 10° to 11°; the point of the coccyx being seven or eight lines above the summit of the arch of the pubis, and the sacro-vertebral angle three inches nine lines higher than the pubis. Mr. Wood has exhausted the subject in his admirable article, to which I would refer the reader.*

The advantages of this obliquity are obvious, and will be more apparent when we consider the position of the uterus. As Dr. F. Ramsbotham has truly observed: "Were the axes of the trunk and pelvic entrance in the same line, owing to the upright position of the human female, the womb, towards the close of gestation, would gravitate low into the pelvis, and produce most injurious pressure on the contained viscera; while in the early months not only would the same distressful inconvenience be occasioned, but there would be great danger of its protruding externally, and appearing as a tumour between the thighs, covered by the inverted vagina."† We may add, that, when not pregnant, the patient would be obnoxious to prolapse of the uterus and the other pelvic viscera, upon making very slight expulsive efforts.

Now let us examine the PELVIS itself. It is divided by the linea ilio-pectinea into the false and true, or upper and lower pelvis. The *Upper* or *False Pelvis* is formed by the lateral

Fig. 5.



(*From Moreau.*)

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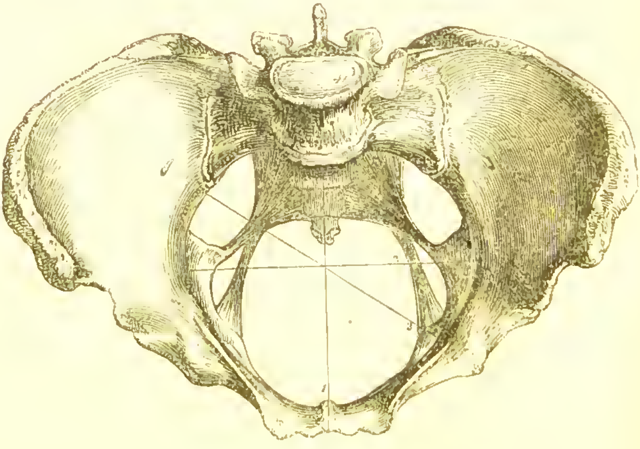
* Cyclopædia of Anatomy and Physiology, Part 44.

† Obstetric Med. and Surgery, p. 12. 2nd Ed.

divergence of the alæ of the ossa innominata. It is not of much importance obstetrically, except for the general relation which its normal size bears to that of the true pelvis, and the inference to be drawn therefrom as to the normal or abnormal condition of the latter. Dr. Burns gives the following measurements, which I believe are correct:—"From the symphysis pubis to the commencement of the iliac wing at the inferior spinous process, is nearly four inches. From the inferior spinous process to the posterior ridge of the ilium, a line subtending the hollow of the costa, measures five inches. The distance from the superior spine is the same. From the top of the crest of the ilium to the brim of the pelvis, a direct line measures three inches and a half. The distance between the two superior anterior spinous processes of the ilium, is fully ten inches. A line drawn from the top of the crest of the ilium to the opposite side, measures rather more than eleven inches, and touches in its course the intervertebral substance between the fourth and fifth lumbar vertebræ. A line drawn from the centre of the third lumbar vertebra, counting from the sacrum to the upper spine of the ilium, measures six inches and three quarters. A line drawn from the same vertebra to the top of the symphysis, measures seven inches and three quarters: and when the subject is erect, this line is exactly perpendicular."*

Fig. 6.



(*From Maygrier.*)

The LOWER or TRUE PELVIS is the part involved in parturition, and which therefore ought to be known with great accuracy. For the purpose of description, it is divided into the brim, cavity, and outlet.

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* Principles of Midwifery, p. 23. 9th Ed.

The Brim of the Pelvis is defined by the linea ilio-pectinea: it is of an oval form, except posteriorly, where the oval is broken by the promontory of the sacrum. Its influence upon labour will be understood, when we recollect that it is the first solid resistance with which the head of the fœtus meets: that any diminution in its size is more hazardous and less remediable than in any other part of the passages; and lastly, that deviations from the normal proportions of the brim most frequently entail similar ones in the cavity.

The three principal *diameters* are, the *antero-posterior* (fig. 6)[1] from the prominence of the sacrum to the inner and upper edge of the symphysis pubis; the *transverse* (2) across the widest part of the brim, at right angles to the antero-posterior; and the *oblique* diameter (3) from the sacro-iliac synchondrosis of one side, to the opposite side of the brim, just above the acetabulum.

Vrolick states that, to exhibit accurately the relations between the head of the fœtus and the brim of the pelvis, their diameters should be so drawn as to intersect each other in the central point of the brim; and to do so, the anterior extremity of the oblique diameter and the transverse diameter must be rather more forward than they are usually placed.*

The measurements of these diameters are not exactly the same in different women, though the variation is but slight. I shall place the measurements given by some of the chief authorities before the reader.

	Denman.	Burns.	Ramsbotham.	Rigby.	Baudelocque.	Velpeau.	Moreau.
Antero-post. diameter	4 in. & a fraction.	4 in.	4 in.	4·3 in.	4 in.	4 in.	4 in.
Transverse .	5	5	5¼	5·4	5	5	5
Oblique . .		5⅛	5	4·8	4½	4½	4½

If we take the smallest of these estimates, there will still be space enough to admit the head of the child; and if we allow half an inch for variations, this will give us a pretty correct idea of the diameters of the brim.

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* Edin. Monthly Journal, Sept. 1852.

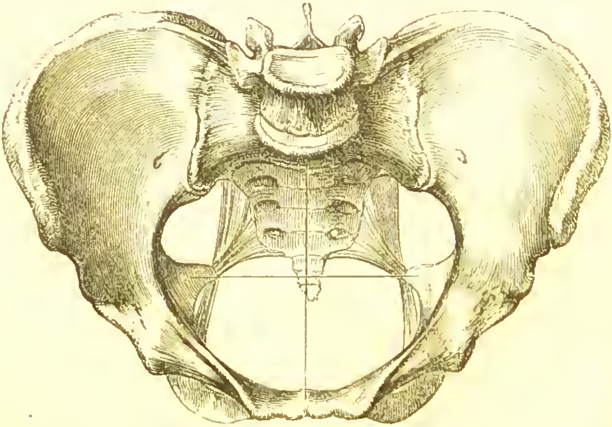
The *circumference* varies from thirteen to fourteen and a half inches.

Dr. Burns has given us some other measurements: "From the sacro-iliac symphysis to the crest of the pubis on the same side is four inches and a half; from the top of the sacrum to that part of the brim which is directly above the foramen thyroideum, is three inches and a half; the line, if drawn to the acetabulum in place of the foramen, is a quarter of an inch shorter; a line drawn across the fore part of the brim, from one acetabulum to the other, is nearly four inches and a quarter."*

The CAVITY OF THE PELVIS, whose fixed boundaries are the sacrum, the ischium, and the pubis, is of unequal depth. Posteriorly it measures five inches, or six if the coccyx be extended; from the brim to the tuber ischii, three inches and three quarters; and the depth of the symphysis pubis is from two to two and a half inches.

The *antero-posterior* diameter from the hollow of the sacrum to the symphysis pubis, is about four inches and a half; the *transverse*, at right angles with the former, is about four inches and three quarters; and the *oblique* about five inches: a variation of a quarter of an inch either way being allowed.

Fig. 7.



(*From Maygrier.*)

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* Principles of Midwifery, p. 20.

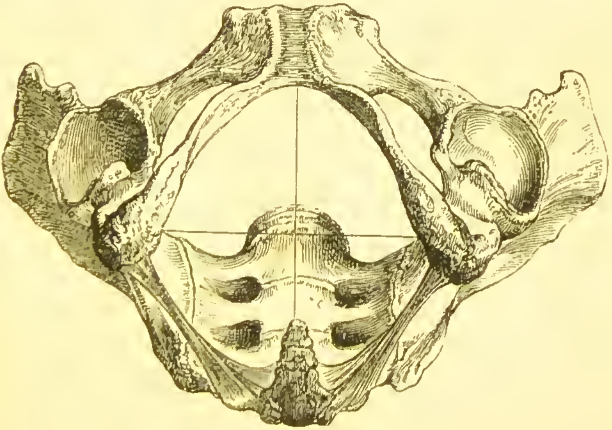
There are other measurements of considerable importance, inasmuch as the child's head passes obliquely through the cavity of the pelvis. Thus, from the sacro-iliac synchondrosis of one side to the tuber ischii of the other, is six inches; and to the ramus of the ischium, five inches: from the anterior margin of the sacrosciatic notch, to the opposite side, is six inches, or six and a quarter; from the anterior margin of the descending ramus of the ischium, to the opposite side, at the same level, is four inches and three quarters.

The bones which constitute the pelvic cavity are smooth on their inner surface, and present a series of *inclined planes*, calculated to influence the direction of the fœtal head in its descent. They tend at first downwards and slightly backwards, then downwards and forwards.

The OUTLET OF THE PELVIS is of an oval shape, but irregular. Its lateral boundaries are immovable; but its antero-posterior diameter may be extended, owing to the mobility of the coccyx. The arch of the pubis, according to Osiander, forms an angle varying between 90° and 100°, and will permit the passage of a circular body whose diameter is an inch and a quarter.

The *antero-posterior diameter* of the outlet, from the arch of the pubis to the point of the coccyx, is from four to five inches; the *transverse*, from one tuber ischii to the other, is about four

Fig. 8.



(*From Maygrier.*)

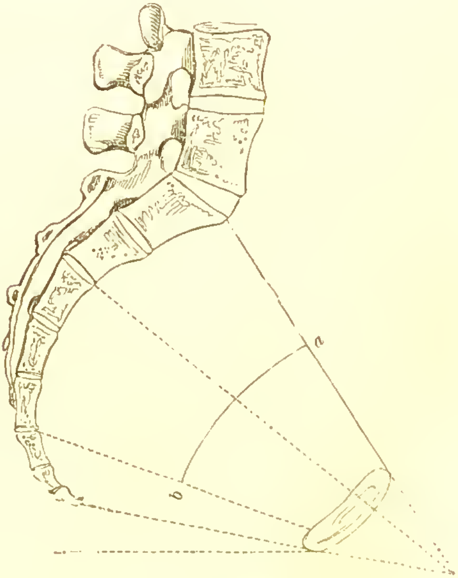
inches; and the *oblique*, four inches and three quarters, allowing for a variation of half an inch.

Now, if we compare the diameters of the brim with those of the outlet, we find that the proportions are completely changed; that which was the shortest at the brim, being the longest at the outlet, and the longest diameter of the brim, being the shortest at the outlet. This remarkable change is, however, effected gradually; for in the cavity we observe merely an approximation in the diameters. The effects of these changes upon the mechanism of parturition are very important, as we shall see by-and-by.

The *axes* of the upper and lower outlet of the pelvis form an obtuse angle with each other; the *former* being described by a line running from the coccyx upward to a little above the umbilicus, and the *latter* by a line drawn from the second bone of the sacrum through the centre of the pubic arch.

If we combine these together with the *inclination* of the pelvis, we shall obtain a tolerably accurate notion of the *direction* of the canal of the pelvis. This is marked out by the central line in the accompanying figure, which I have copied from one given by

Fig. 9.



(*From Naegelè.*)

M. Danyau in his translation of Naegelè's work on Oblique Distortion.

There is a considerable *difference* between the *male and female pelvis*, both in shape and size. In the former, the brim is more circular, and the cavity deeper. In the male, the depth of the symphysis pubis is nearly double that of the female; the sacrum is more perpendicular; the sacro-sciatic notches and foramina smaller; the obturator foramen oval; the arch of the pubis is narrower, its angle being about 70° or 80°; the tubera ischii are nearer to each other, and the coccyx less movable. I believe also that the curve of the lumbar vertebræ is greater in the female, so as to increase the obliquity of the pelvis, especially in the upright position. The same obliquity is preserved in the sitting posture by the greater size of the buttocks in the female.

From the greater width of the female pelvis, the acetabula are further apart than in the male, although the thigh bones approach each other in their descent, and the knees (in the erect position) are nearly in contact, giving a peculiarity to the movements of the female not observable in the other sex.

So far, we have considered the skeleton pelvis only; but the subject would be incomplete without a brief notice of the soft parts lining the pelvis, and covering it externally. The former modify the diameters of the pelvis, and the latter must be taken into account in forming a diagnosis in the living subject.

The iliac fossæ are each occupied by the iliacus internus muscle, internal to which, and slightly overlapping the edge of the brim, is the psoas muscle; these pass over the anterior part of the brim to their insertions. Near the inner margin of the psoas muscle we find the iliac artery and vein, with the crural nerves and lymphatics. In the cavity we find the obturator internus and the pyramidalis muscles, with the hæmorrhoidal and sacral vessels, and the sacral nerves. The rectum passes down nearly in the centre of the sacrum, and the bladder lies behind and above the symphysis pubis. These parts are held *in situ* by cellular membrane, superficial and deep fascia, &c.

The lower outlet is nearly closed by soft parts, which are capable of great distension. On either side of the sacrum and coccyx are situated the sacro-sciatic ligament, the coccygeus muscle, and layers of fascia and cellular substance; whilst the termination of the rectum, and the perineum, consisting of transverse muscular fibres, fascia and cellular tissue, close the outlet posterior to the orifice of the vagina.

The effect of these additions, in diminishing the internal measurements of the pelvis, is not very great, except at the lower outlet. The transverse diameter of the brim is diminished about half an inch, or rather more when the psoæ muscles are in action, and the conjugate diameter about a quarter of an inch. The diameters of the cavity are not lessened more than a quarter of an inch. The lower outlet may be said to be almost closed in the absence of any distending force, the orifice of the vagina being the only vacancy; but the elasticity of the perinæum, &c., occasions the soft parts to be little or no permanent diminution of the antero-posterior diameter.

To the crest of the ilium the abdominal muscles are attached, and on the outer surface of the ossa innominata there is a large mass of muscles, the glutæi, pyriformis, gemellus superior and inferior, obturator internus and externus, and quadratus femoris. These muscles are separated by fascia, and are covered by a thick layer of adipose tissue, and the skin. The anterior wall of the pelvis gives origin to a great number of muscles, most of which have been already enumerated.

The *external measurements* of the pelvis are of considerable importance in the diagnosis of deformity, as deviations externally appreciable will, in most cases, though not in all, be found to accompany internal ones. Unfortunately, the data we possess are but few; however, the following, I believe, are correct:—

The external antero-posterior diameter of the pelvis, is from 7 to 8 inches.
The external transverse, between the crista ilii of each side, 13 to 16 inches.
From the anterior superior spine of one side to the other, 10 to 12 inches.
From the great trochanter of one side to the sacro-iliac synchondrosis of the other, 9 inches.
The depth of the pelvis, from the top of the sacrum to the coccyx, from 4 to 5 inches.

In order from these measurements to form a sufficiently correct estimate of the internal diameters of the pelvis, we must deduct from them the thickness of the parietes; *i.e.* about three inches antero-posteriorly, and four inches laterally, according to Baudelocque, Navas, and Velpeau. The depth is easily ascertained externally; posteriorly, by taking the length of the sacrum; laterally, by measuring from the anterior superior spine of the ilium, and dividing by two; and anteriorly, by taking the depth of the symphysis pubis. It is but fair to add, that doubts have been expressed of the utility and accuracy of these measurements, by Mesdames Boivin and Lachappelle, on account of the varying thickness of the parietes of the pelvis: but, even allowing for this, they appear to me of some value as an approximative estimate.

In this opinion I am supported by M. Naegelè, who, in his recent work on Oblique Distortion, has pointed out certain external measurements as a means of diagnosis, and has given a careful estimate of forty-two cases. His French translator, M. Danyau, has added to these eighty cases measured by himself, and the average result is as follows:

1. From the tuber ischii of one side to the posterior superior spinous process of the opposite side, 6 inches 6 lines.
2. From the anterior superior spine of the ilium of one side to the posterior superior spine of the other side, 7 inches 10 lines.
3. From the spinous process of the last lumbar vertebra to the anterior superior spine of the ilium of either side, 6 inches 7 or 8 lines.
4. From the great trochanter of one side to the posterior superior spine of the ilium of the opposite side, 8 inches 2 lines.
5. From the centre of the inferior edge of the symphysis pubis to the posterior superior spine of the ilium of either side, 6 inches 3 or 4 lines.*

These measurements are those of ordinary-sized pelves; they will of course vary if the pelvis be unusually large or small; but the utmost variation in No. 1 was 6 lines; in No. 2 was 11 lines; in No. 3 was 7 lines; in No. 4 was 9 lines; and in No. 5 was 9 lines; and these were almost all single exceptions.

The next point relates to the practical application of these facts, or, in other words, to the best mode of ascertaining the size of the pelvis in the living subject. A certain amount of information may be obtained from the general and equable contour of the pelvis, the breadth of the hips as compared with the shoulders, the degree of obliquity of the pelvis, the curve of the sacrum, &c.; and in many cases we may pronounce, from a cursory glance, that the patient is well or ill made. Should this not be so apparent, we must have recourse to external measurement, which is easily effected by means of a pair of curved calipers and a foot measure. Care must be taken to place the points of the instrument accurately, as a slight deviation may produce different and incorrect results. The measurements thus obtained we can reduce to the internal diameters of the pelvis by making the deductions already mentioned, although without any pretensions to absolute accuracy.

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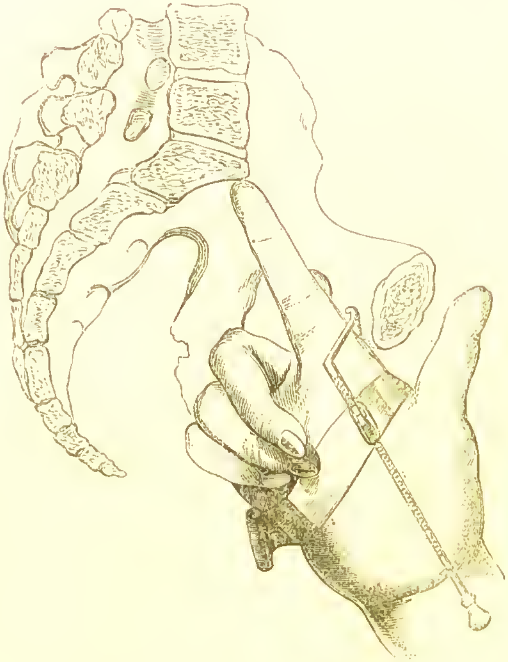
* Des Principaux Vices de Conformation du Bassin, par Naegelè, translated by M. Danyau.

There is greater difficulty in ascertaining the magnitude of the pelvis internally. In Great Britain we are almost limited to the information afforded by the "*toucher;*" and undoubtedly, by this means alone, a well-educated finger may obtain a sufficiently accurate estimate for practical purposes. When making an examination for this purpose, the finger should be passed direct to the promontory of the sacrum, and thence carried forward slowly to the symphysis pubis: we may then pass it across the pelvis, in the direction of the transverse and oblique diameters, and finally follow the course of the brim, taking note of any deviation from the usual form, or of any obstacle. The state of the sacrum and cavity generally, and the mobility of the coccyx, can readily be ascertained by the finger, as well as the dimensions of the lower outlet. Although deficient in precision, the infor-

Fig. 10.



mation thus obtained may satisfy us of the possibility of the passage of the child; and of course, if the patient be pregnant, and still better if she be in labour, there will be more certainty, as we shall then have the child's head as a standard of comparison.

But, in order to arrive at greater accuracy, certain instruments have been invented, chiefly by continental obstetricians, for measuring the internal as well as the external diameters of the pelvis. Thus we have the "*compas d'épaisseur*" of Baudelocque, the "*cephalometre*" of Stein, the "*mecometre*" of Chaussier, the "*pelvimeters*" of De Creve, Aitken, Coutouly, Bang, Traisnel, &c., with various modifications of modern invention; but I do not think it necessary to enter into any minute description of these instruments, as they are seldom, if ever, used in these countries. Dr. Greenhalgh has allowed me to give a plate of his new pelvimeter (fig. 10), which appears to me a good one, and more easily applied than others. The fore-finger being placed on the promontory of the sacrum, the movable arm of the instrument is to be drawn back until arrested by the symphysis pubis, and the measurement thus marked off upon the finger will be the antero-posterior diameter of the brim. The natural delicacy of the sex precludes their employment in the cases in which they would be of the greatest value: I mean before marriage, or conception.

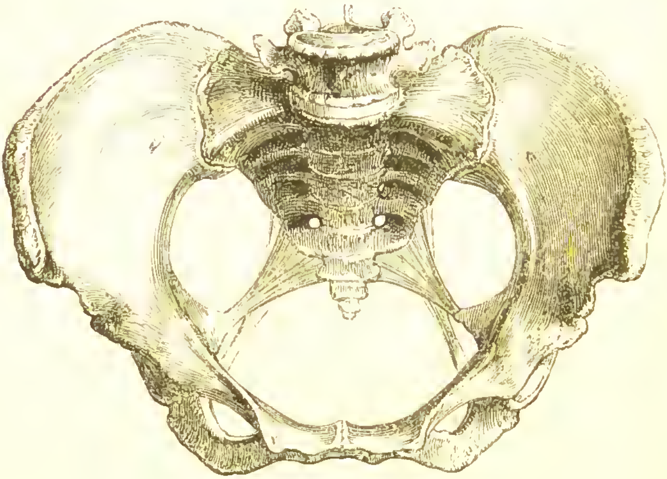
CHAPTER IV.

ABNORMAL DEVIATIONS IN THE PELVIS.—DEFORMITIES.

Under this title I shall include not merely distortions of the pelvis, but also certain equable deviations from its normal dimensions, which are of importance. The abnormal deviations of the pelvis may be either *general* or *special.* The *general* or *equable* deformity of the pelvis involves the whole of the true pelvis equally, and may consist either in an *excess* or *diminution* of its usual dimensions.

The *former* of these—the *pelvis æquabiliter justo major* of continental writers (fig. 11)—is not very unusual, nor is it advantageous in parturition, except perhaps in face presentations, and it may be attended with inconvenience. Giles de la Tourette has recorded one where the antero-posterior diameter was five inches and a half, the transverse six and a half, both diameters of the lower outlet five and a half, and the distance between the crests of the ilia twelve and a half inches. Dr. Burns mentions his having a very large one, but not quite equal to the one just mentioned. My friend Dr. Murphy possesses one of about the same size. The relative proportion of the diameters sometimes varies, so that the brim may assume an oval shape antero-posteriorly, or a heart shape, and still all the diameters be excessive.

Fig. 11.

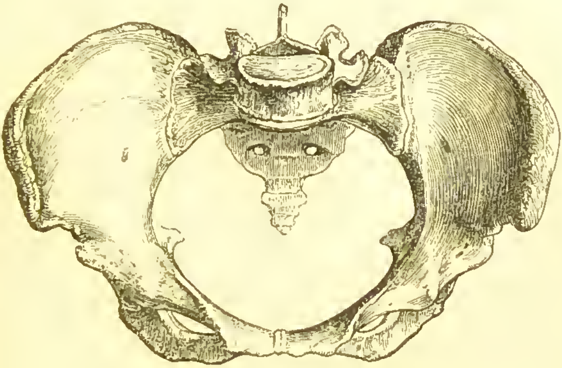


(*From Maygrier.*)

It is evident that a pelvis preternaturally large may be a disadvantage to a female who is not pregnant, as it will favour prolapse of the pelvic viscera; and also to one who is pregnant, by more readily permitting descents, displacements, &c. Its inconvenience during parturition consists in the want of that degree of contact with the head of the child necessary to impress upon it the usual partial rotations and changes of direction; and the facility with which it would admit of prolapse of the womb afterwards.

It is more rare to find a pelvis whose size is equally *diminished* (fig. 12)—the *pelvis æquabiliter justo minor*—without much relative disproportion between its diameters, although Naegelè and Velpeau think it more common than writers in general have supposed; and in support of this opinion it may be added, that modern investigations have discovered that in many, if not most cases of rickets, even where there is no apparent distortion of the pelvis, there is a certain diminution (one fourth, I believe) in the aggregate diameters. The obstruction which this deformity offers to delivery is sufficiently obvious.

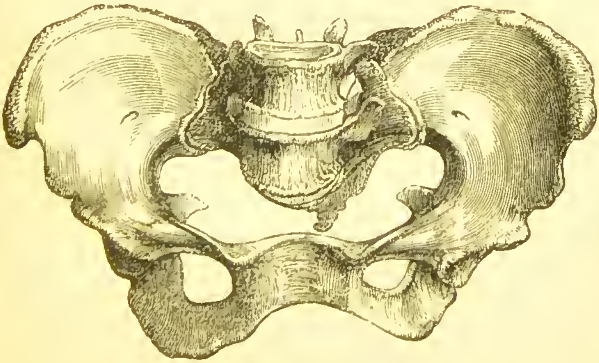
Fig. 12.



(*From Moreau.*)

The *special distortions of the pelvis* are much more frequent. They occur at the brim, in the cavity, or at the lower outlet, but are rarely limited to one of these situations. The distortion may also occur in any of the diameters, though the antero-posterior diameter of the brim, and the transverse of the lower outlet, present them most frequently.

Fig. 13.

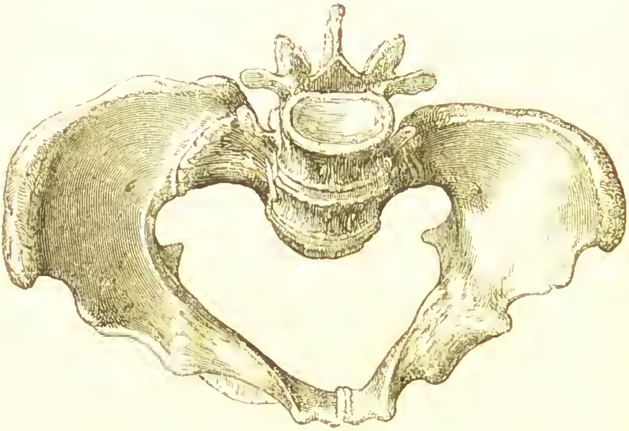


(*From Moreau.*)

At the brim (fig. 13) we find distortions more common in the antero-posterior diameter, as I have said; next in the oblique, and lastly in the transverse diameter.

The sacrum may be pushed forward toward the symphysis, or the symphysis toward the sacrum.

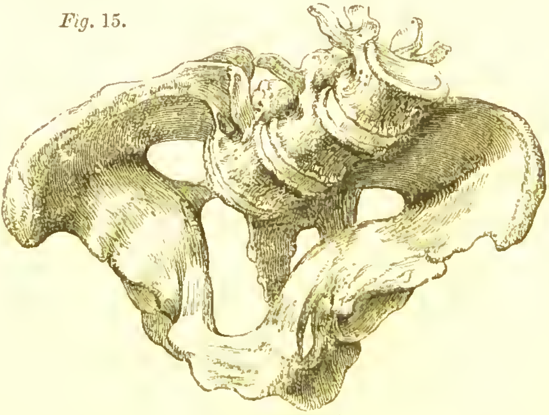
Fig. 14.



(*From Moreau.*)

If the sacrum be more slightly pressed forward, it will make the opening a heart shape (fig. 14), and may change the length of the oblique as well as the antero-posterior diameters.

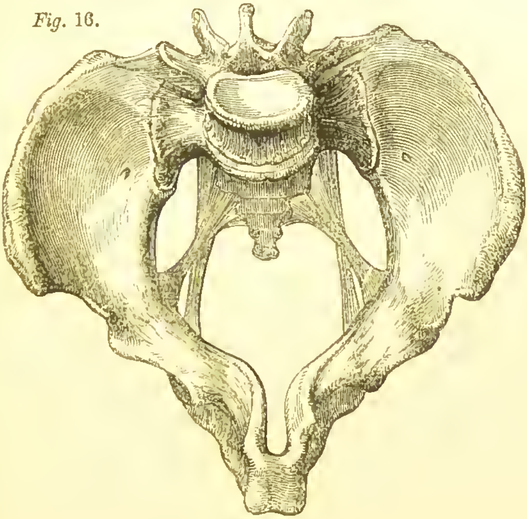
Fig. 15.



(*From Moreau.*)

In some cases the acetabula are pushed inwards, as well as the sacrum forwards (fig. 15), diminishing the oblique and antero-posterior diameters, and completely distorting the brim. This was the case with Isabel Redman, operated upon by Dr. Hull; and similar examples are recorded by Weidmann, Aitken, Mad. Boivin, &c.

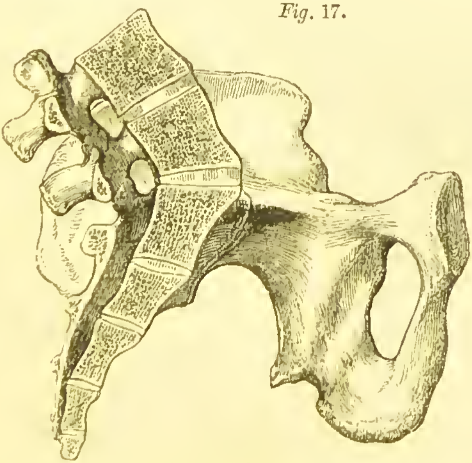
Fig. 16.



(*From Moreau.*)

In other cases, the oval of the brim is transposed, the long diameter being antero-posterior instead of transverse; as in fig. 16.

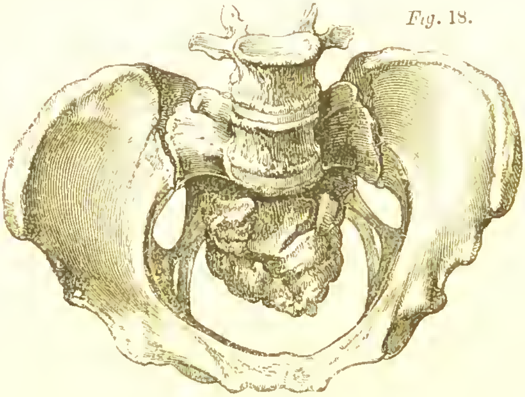
Fig. 17.



(*From Moreau.*)

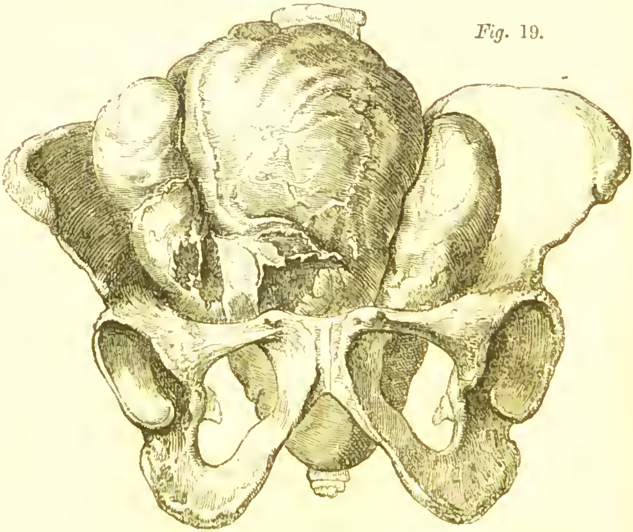
In the cavity, distortions are in most cases consequent upon those of the brim or outlet; though we occasionally meet with instances where the sacrum is too much or too little curved (fig. 17), when the other parts of the pelvis are of normal form. In some very rare cases the cavity contracts gradually from the brim to the outlet, forming what has been called a "funnel-shaped pelvis."

Fig. 18.



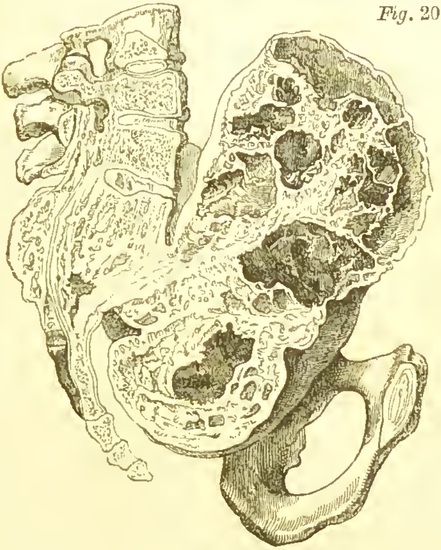
(*From Dr. McClintock.*)

Fig. 19.



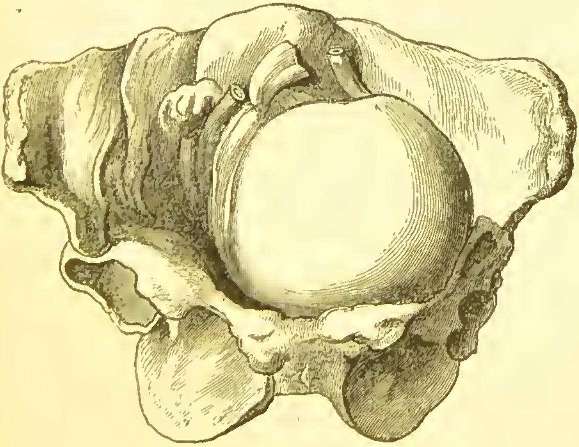
The capacity of the cavity may also be diminished by a fibrous or bony growth from the sacrum, as in the annexed figures.

Fig. 20.



The first (fig. 18) is comparatively small, though sufficient to interfere seriously with labour; the second (figs. 19, 20) which

Fig. 21.



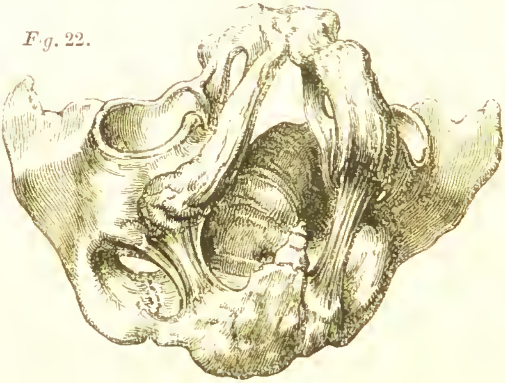
(*Dr. Shekelton.*)

is an exostosis, would preclude the possibility of delivery "*per vias naturales.*"

Fig. 21 is a fibrous growth from the periosteum: the case occurred in the Dublin Lying-in Hospital, and has been described by Dr. Shekelton,* to whom I am indebted for the cast from which this drawing has been taken. These morbid growths from the periosteum or bone involve the same difficulty as distortions, inasmuch as they are incompressible and immovable; but, unlike most distortions, they increase slowly, so that the longer they continue, the greater the obstacle.

The *lower outlet* is comparatively independent of the brim and cavity. It is by no means uncommon to experience delay, arising from a narrowing of the brim, with a rapid passage of the head through the outlet; but of course, in extreme cases of distortion, the outlet participates, as is shown in the figures annexed; fig. 22 being the lower outlet of fig. 15, and fig. 23 of fig. 16. On the other hand, distortions of the lower outlet may occur with a normal shape and size of the brim. They are most frequent in the transverse diameter, owing to the approximation of the tubera ischii, which at the same time will diminish the span of the arch of the pubis, and so effectually, though not apparently, shorten the antero-posterior diameter. The other way in which the latter diameter is lessened, is by too great a curve forward of the lower part of the sacrum and coccyx, and by the anchylosis of the coccygeal joint. There is a case related by Dr. Summer, in the American Journal of

Fig. 22.



(*From Moreau.*)

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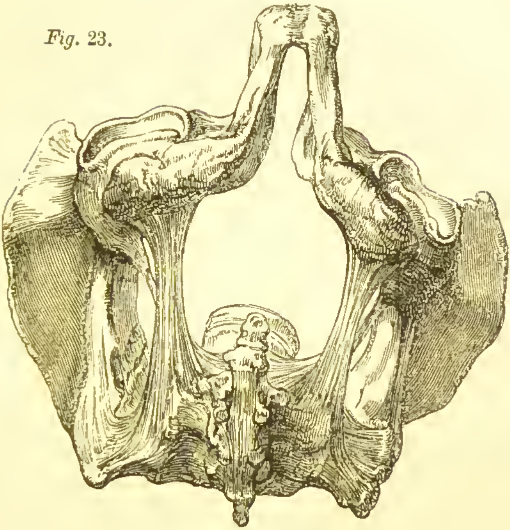
* Dublin Journal, vol. x, p. 287. *New Series.*

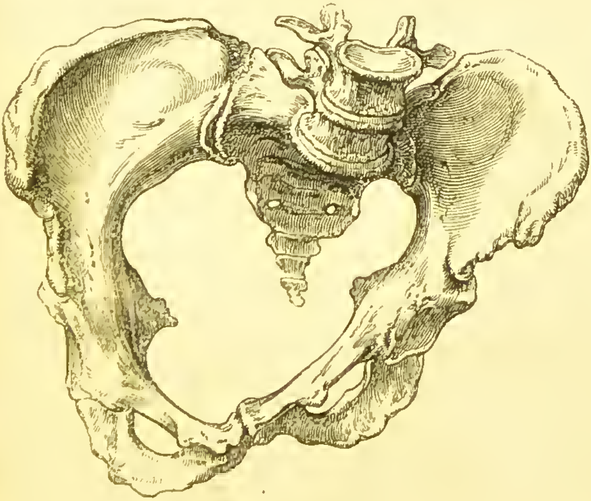
Fig. 23.



(*From Moreau.*)

Medicine, in which the projection of the coccyx, the joint being anchylosed, was so great as to cause the death of three infants

Fig. 24.



(*From Naegelè.*)

successively. The fourth time Dr. S. endeavoured to straighten it, but being unable, he broke it, and the child was born alive. The same proceeding was necessary in two subsequent labours. The spinous process of the ischium may offer some obstruction, if it be unusually long, and curved inwards.

The *amount* of these distortions varies as much as possible: it may be so slight as merely to retard delivery; or it may be so great as to preclude it altogether, as in Mr. Bell's case, where the antero-posterior diameter was about half an inch, or in that recorded by M. Naegelè, in which it was even less.

In most cases of pelvic deformity the distortion is somewhat unequal, one side suffering more than the other; but there is a class of cases in which this distortion is almost entirely confined to one side. An allusion to such will be found in several authors; but it remained for M. Naegelè to add to his high reputation by a careful and accurate description of this *oblique distortion* ("*das schräg verengte becken*," or "*pelvis obliquè ovata*"). In these cases (fig. 24), the affected side is flattened, and the sacro-iliac synchondrosis anchylosed. Half the sacrum is imperfectly developed; and the other, though at first sight it appears well formed, is found to be awry: the promontory of the sacrum and the symphysis pubis are not (as they ought to be) opposite to each other, but the former leans to the affected side, and the latter is pushed over (as it were) to the sounder side, so as to make the form of the pelvis oblique.

As we should expect, the *planes* and *axes* are altered more or less in all well-marked cases of distortion. When the promontory of the sacrum projects, the axis of the upper outlet is more horizontal; but, if the acetabula are pressed inwards, it may become more perpendicular. The axis of the lower outlet may be changed in the opposite, but more frequently in the same direction, the two becoming almost parallel: nay, there is a case quoted by Velpeau in which they were reversed; that of the lower outlet looking forward, whilst that of the brim was directed backward. In the majority of cases, I believe we may say, that the planes and axes of both outlets approximate to the plane of the horizon.

The principal *causes* of distortion are, 1, rickets in infancy and childhood; and, 2, malacosteon, or mollities ossium, in adults. The effect of both diseases is to deprive the bony structure of the earthy matter which gives it firmness; in the absence of which, the bones become flexible, and are influenced by muscular motion, or long-continued pressure. Thus, if in such circumstances the patient maintain the sitting posture long, the promontory of the sacrum may be pushed forwards, or the symphysis upwards; the lower part of the sacrum may be too much curved, and the os coccygis rendered horizontal. If the upright position be continued long, the acetabula may be pressed inwards, and the promontory of the sacrum forwards. If the patient lie much on her back, the sacrum may be flattened; or, if on one side, it may be rendered unequal.

Besides these special deformities, it has already been mentioned, that, in patients affected with rickets, the aggregate of the diameters of the pelvis is lessened one-fourth, even when the pelvis is *apparently* unaffected.

Any of these special distortions may occur in the same way in adults affected with malacosteon, and at any period of their life; so that it has happened that a female, who had borne children naturally, has at a subsequent labour exhibited such an extent of pelvic distortion, as required the use of instruments, or the Cæsarean operation.*

Both diseases appear to be more frequent in manufacturing towns than in country districts.

It is extremely difficult to assign the cause of oblique distortion. Naegelè states that he could detect no traces of rickets or mollities ossium in any of his cases, nor had any suffered from external violence. The bones presented the same appearance as those of healthy young females. He believes that it neither arises from external causes, nor from internal disease, but from an original anomaly of development.† Dr. Rigby, however, thinks that ulcerative absorption must have existed at the sacro-iliac junction, probably in early life. Dr. Litzmann and Oldshausen attribute both the anchylosis and the peculiar shape to pressure upwards from the hip-joint of the affected side.

I have already mentioned as a cause of deformity, 3, exostosis; and may further add, 4, fracture of the pelvis, and 5, inflammation of the sacro-coccygeal joint, terminating in anchylosis, to which I have already referred, but upon which it is unnecessary that I should dwell.

The *diagnosis* of distortion is easy in proportion to its amount. If the pelvis be much deformed, it may be detected by an external or internal examination, and estimated with sufficient accuracy for practical purposes. But if it be only slightly affected, it will not be so easy to decide upon the possibility of the passage of the child, unless we have the head of the child, to compare with the pelvis. Without this, we must chiefly depend upon a comparison of the external measurements with those of a well-formed pelvis, and upon the information obtained by a careful internal examination. From these sources, an experienced practitioner will probably obtain data for a satisfactory though cautious diagnosis. But if we are not consulted until the patient be in labour, our task will be comparatively easy, because the head will be in apposition with the part (brim, cavity, or outlet) where we suspect the narrowing to exist.

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* See case by Johnston and Sinclair, Dublin Journal, Aug. 1855, vol. 60, p. 179.

† The reader will find an excellent translation of Naegelè's valuable memoir, by Dr. Christie, of Aberdeen, in the British Record of Obstetric Medicine.

Dr. Simpson's plan is to place the patient under the influence of chloroform, and then introduce the entire hand into the pelvis; the breadth of the knuckles, when the hand is closed, affords a definite object of comparison with the antero-posterior diameter of the brim.

A very slight degree of narrowing of the transverse diameter of the lower outlet may be detected, by its rendering the arch of the pubis more acute, and, consequently, preventing the head of the child pressing close up under it. Whenever we find the head fitting tightly between the tubera ischii, and yet a space under the arch of the pubis free, we may be certain that the tubera ischii are closer together than natural.

Oblique distortion may be detected in two ways, according to M. Naegelè: 1, by dropping a line perpendicularly from the spinous process of the last lumbar vertebra, and another from the symphysis pubis; when the pelvis is well formed, these two lines are exactly one behind the other: but when it is obliquely distorted, they are parallel, with a considerable interval: 2, by measuring the pelvis externally in the way already described, we find that there is always a difference between the two sides of the pelvis, varying from one to two inches. To give an example, in a pelvis affected with oblique distortion of the left side, the measurement No. 1, was

	6 in.	11	lines	on the	left side,	and	5 in.	8	lines	on the right.
No. 2,	7 ...	9	,,	,,	,,	,,	6...	10	,,	,,
No. 3,	6 ...	6	,,	,,	,,	,,	5...	3	,,	,,
No. 4,	9 ...	0	,,	,,	,,	,,	8...	0	,,	,,
No. 5,	6 ...	11	,,	,,	,,	,,	6...	1	,,	,,

Let the reader compare these with the measurements of a well-formed pelvis, as already given, and he will be convinced that either method, or the two combined, will afford fair grounds for a diagnosis.

Anchylosis of the sacro-coccygeal joint will be discovered by its immobility when pressed by the finger during an internal examination.

The effect of the different kinds and degrees of deformity upon the mechanism of parturition, and the practical considerations upon which the management of such cases must be founded, will be discussed in the Third Part of this work.

CHAPTER V.

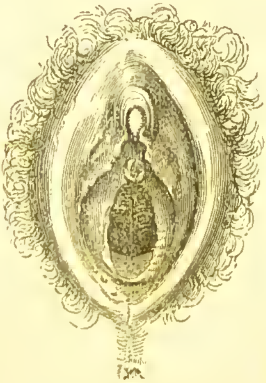
OF THE EXTERNAL ORGANS OF GENERATION.

WE may now proceed to describe the generative organs in the female. These are ordinarily divided into the *external* and *internal*, or, with regard to their functions, into the *copulative* and *formative*. The external or copulative, consist of the mons veneris, the labia majora, and minora, the clitoris, the hymen, and the vagina. The internal or formative, consist of the ovaries, the fallopian tubes and uterus. Most English writers place the vagina among the internal organs; but, as it belongs to the copulative, I have classed it with them; the point is of little importance. There is a striking analogy between the male and female organs, except as to situation; and at an early period of fœtal life, the sex cannot be distinguished. In the present chapter we shall notice the external organs.

The MONS VENERIS is the triangular, cushion-like prominence at the lower part of the abdomen and upper part of the symphysis pubis. It consists of a thick layer of adipose tissue underneath the skin, upon which, at puberty, a quantity of hair makes its appearance. I have remarked a peculiarity in women with regard to this growth of hair. It is strictly confined to the labia and mons veneris, and scarcely ever extends to the thighs in the neighbourhood of the vulva. In the cellular tissue, is lost the round ligament, and there is sometimes a small pouch of peritoneum. The skin is plentifully supplied with sebaceous glands.

The *use* of this cushion is not very evident.

Fig. 25.



(*From Maygrier.*)

Abnormal deviations.—Occasionally the growth of hair is excessive. In one case Dr. Davis found it necessary to destroy it, on account of the itching it caused. On the other hand, in some cases it is nearly absent without apparent inconvenience. This part is also the seat of cutaneous eruptions and abscesses.*

The LABIA MAJORA, *vel* EXTERNA, are two folds of skin externally, and mucous membrane internally, continued downwards from the sides of the mons veneris to the fourchette. Their junction superiorly constitutes the anterior commissure of the vulva, and they enclose the external organs of generation. Their breadth and thickness are greatest superiorly, gradually decreasing until they disappear near the fourchette. Superiorly they are in contact, but they are separated posteriorly. The external labia contain, between the skin and mucous membrane, subcutaneous fascia, adipose and cellular tissue, nerves and bloodvessels, and glands. M. Huguier, in a very elaborate *mémoire*, has described these glands, which he divides into three varieties—"follicules sebacès, pilifères, et organes mucipares." The most important are, however, those he has termed the vulvo-vaginal glands, which are situated one on each side of the vaginal orifice, and a little behind it, opening by ducts about half an inch long near the hymen at the base of the carunculæ. They are about the size of a small almond, and secrete mucus profusely at certain times. They are thought to be the analogues of Cowper's glands in the male.† Externally, the labia are thinly covered with hair, and thickly studded with sebaceous follicles.

Their *use* is to protect the sensitive organs contained between them, and at the time of labour to facilitate the distension of the external orifice.

Abnormal deviations.—These are chiefly, 1, excessive growth, attended with mechanical inconvenience; 2, inflammation and abscess; 3, cutaneous eruptions, pruritus, &c.; and 4, encysted tumours, hernia, &c. I cannot too strongly impress my junior readers with the importance of acquainting themselves with the deviations from the usual conditions or relations of these external organs, which do not involve actual disease, nor require operative interference.

The LABIA MINORA, or NYMPHÆ, are two lateral folds of mucous membrane, internal to the labia majora, with which they are in contact externally, and by which they are generally covered in the adult. They extend from the anterior superior portion of the vulva to about the middle of the orifice of the vagina, and contain between their mucous coats a spongy vascular tissue and nerves. They enfold the clitoris, the meatus urinarius, and cover part of the vaginal orifice. In young persons they are firm and elastic, but in old age they become flabby and loose.

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* It would be inconsistent with the object of a work like the present to enter into details upon the various diseases to which the parts are subject; I must therefore content myself with enumerating them, and refer the reader to my work on Diseases of Women.

† Mém. de l'Acad. Méd. de Paris, vol. xv. p. 528.

They doubtless contribute, with the labia majora, to maintain the integrity and sensibility of the parts they cover.

Abnormal deviations.—The nymphæ are obnoxious to inflammation, follicular ulceration, and hypertrophy, either congenital or the result of disease. It is very common to find them protruding to some extent, without disease, and covered with cuticle externally. These are sometimes treated as abnormal, and amputated, but very unnecessarily. I have occasionally seen one of the natural size, and the other large and protruding.

The CLITORIS is the analogue of the penis in the male. It consists of two corpora cavernosa, which arise from the rami of the ischia and pubis, and unite on the symphysis pubis. It possesses two muscles analogous to the erectores penis, and terminates in a gland covered by a prepuce, but which is imperforate. The clitoris projects about the eighth of an inch, and is situated just below the point of junction of the nymphæ. It is richly endowed with nerves, extremely sensitive, capable of erection, and is said to be the seat of sexual gratification. In the fœtus it is disproportionately large, but it does not increase afterwards in proportion to the surrounding parts.

Abnormal deviations.—The clitoris may vary in size from congenital malformation or disease. I have seen it protruding beyond the labia, and in a few cases it occupied the commissure of the labia; but the researches of M. Parent-Duchatelet* have disproved the opinion that it enlarges from frequent sexual indulgence; and, according to the same high authority, its excessive development does not entail extreme sexual desire.

This organ may be attacked by inflammation, or by malignant disease. Bartholinus relates the case of a courtezan whose clitoris was the seat of calcareous deposition.

Below the clitoris there is a smooth triangular space,—the VESTIBULUM,—at the lower part of which we find the ORIFICE OF THE URETHRA, or the MEATUS URINARIUS, just at the upper edge of the orifice of the vagina. The exact situation of this opening is important, because we are frequently called upon to introduce the catheter, and in ordinary cases it should be done without exposure. The operation is not difficult: the patient being placed on her back, and the labia being separated, the point of the forefinger of the left hand should be placed just within the orifice of the vagina, so as to press slightly its upper edge: the catheter should then be passed along the inner surface of the finger, until it reaches the vestibulum, near the edge of the vaginal opening; when there, a very slight movement will cause it to enter the meatus urinarius. Or the patient may be placed on her left side, in the ordinary position for labour, and the finger carried from behind forward to the vestibulum; the catheter should then be passed along the finger in the direction of the axis of the outlet, and on reaching the vestibulum, a slight movement will detect the orifice. The operation is more difficult when the parts are swollen or distorted, as happens occasionally from disease, during pregnancy or labour, and after delivery; and if we cannot detect the orifice by the touch, we must of course use a light; and then, for obvious reasons, it is better that the patient should be placed on her side.

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* De la Prostitution de la Ville de Paris. 1836.

The orifice is round, though its sides are usually in contact, and its edges are somewhat thickened.

The URETHRA is a membranous canal about an inch or an inch and a half in length, dilatable, and directed obliquely from before backwards, and from below upwards, running under and behind the symphysis pubis, from which it is separated by loose cellular tissue. Internally it opens into the bladder. Its direction is subject to variation. During pregnancy, the bladder being carried upwards with the uterus, the urethra curves under the pubic arch, and then ascends perpendicularly. The same change occurs when the uterus is enlarged from other causes. In prolapse of the pelvic viscera its course is reversed. These changes should be borne in mind when catheterism is required.

Immediately below the orifice of the urethra we find a much larger opening, of about an inch in diameter,—the ORIFICE OF THE VAGINA. Ordinarily its sides are in contact laterally, but it is capable of enormous distension, and of again returning to its natural size. The opening is closed inferiorly in infants, by a fold of mucous membrane of a crescentic shape, the concavity looking upwards, and which is called the HYMEN. This membrane is easily destroyed, or it may become so relaxed as scarcely to be perceptible, which will account for its rarity in adults. It was formerly held to be peculiar to the human female, but the researches of MM. Duvernoy, Cuvier, and Steller have proved its existence in many animals. From very early times it has been made the test of virginity, its absence being considered conclusive proof of sexual intercourse having taken place; and the fate of some of the wives of Henry VIII. is an extreme instance of the injustice to which this opinion led. Modern investigations have proved, not only that it may be destroyed by many causes unconnected with sexual indulgence, but that intercourse may take place, followed by pregnancy, without its destruction, as in three cases which occurred in my own practice. It is therefore of no value as a test of virginity.

Abnormal deviations.—The principal ones are the following: 1, it may be unusually thick and strong, so as to preclude intromission; 2, instead of the single opening superiorly, it may be pierced with several small holes; 3, instead of the usual form, the hymen may consist of a single or double bridle stretching across the orifice of the vagina; or, 4, it may be imperforate, and close the vagina completely. Examples of each kind are recorded in the different works on midwifery, and in the periodicals. These abnormal deviations are of importance only as they may prevent sexual connexion, or impede the natural discharges or delivery; and once discovered, they are easily remedied.

The CARUNCULÆ MYRTIFORMES are four or five small tubercles, which in most females occupy the situation of the hymen, of which they are considered the remains by most anatomists: others, however, suppose them to be small duplicatures of the mucous membrane of the vagina. They may possibly facilitate the distension of the orifice of the vagina by unfolding.

Abnormal deviations.—Occasionally they are greatly hypertrophied.

The parts contained within the vulva are abundantly supplied with nerves, owing to which, and to the extreme delicacy of their texture, they possess exquisite sensibility. This explains the very severe pain which accompanies even trifling diseases of these parts; and it is merely a repetition of the fact observed in other mucous membranes—viz., that they acquire their highest degree of sensibility near their junction with the skin.

The FOURCHETTE is the inner edge of the posterior commissure of the vulva, and the anterior border of the perineum, between which is a space called the fossa navicularis; it is formed by the union posteriorly of the labia. It consists of a fold of mucous membrane, meeting externally the skin of the perineum, and is frequently, perhaps generally, torn slightly in first labours.

The PERINEUM is the name given to the space between the posterior commissure and the anus. It is of a somewhat triangular shape, and its medium length, in women who have not borne children, is from one to two inches. It is shorter, of course, in those who have had children. In the centre a prominent line may be observed, running antero-posteriorly, called the "*raphe*." The perineum is composed of various tissues; externally there is the skin, then adipose and cellular tissue, fascia, a portion of the constrictor vaginæ, levator ani, transverse and sphincter muscles; besides which, it contains the superficial and transverse arteries, veins, nerves, and lymphatics. Very few hairs grow on this part.

The *use* of the perineum is obvious: it closes the lower outlet posteriorly, so as to prevent the prolapse of the pelvic viscera; whilst it admits of distension when necessary, and by its elasticity, speedily resumes its former condition.

Abnormal deviations.—The perineum is sometimes unusually long, increasing the risk of its laceration during labour; or it may be very short, and so afford inadequate support to the superimposed viscera. It may be torn in various ways during labour, as we shall see hereafter, and either not unite or present the cicatrices of former lacerations. It is sometimes the seat of hernia, according to Smellie, Mery, and Curade.

The VAGINA is a musculo-membranous canal, extending from its orifice in the vulva obliquely through the cavity of the pelvis to the uterus. It passes upwards from the vulva behind and below the urethra and bladder, between the ureters, and anterior to the rectum, describing nearly the line of the canal of the pelvis. Its form is cylindrical, somewhat flattened superiorly, but, when quiescent, its parietes are always in contact, so that from birth until puberty there is no reason to suppose that they are ever separated, and afterwards only by external or internal forces. The junction is of their anterior and posterior surfaces, never laterally, and we shall see that by this arrangement not only is the uterus protected from external influences, but is efficiently aided in preserving its position. Its dimensions vary according to age, and other circumstances; for instance, it is proportionately longer in the fœtus than in the child. In some individuals it is very long, in others very short. Dr. Dewees mentions a case where it was only an inch and a half long, and I have met with others nearly as short. It is also longer and narrower in virgins than in those who have borne children. Ordinarily it is about six inches in length, by one in width.

The proper tissue of the vagina is dense, and of a grey pearly colour, resembling in some degree fibrous tissue, and about a line and a half in thickness anteriorly, though less near the womb. It is well supplied with vessels, which are multiplied and interlaced so much towards its anterior extremity as to constitute a kind of erectile tissue, which has received the name of *plexus retiformis.* Internally, the vagina is lined by mucous membrane of a pale pink colour, continued from the vulva, and which near the orifice, and there only, possesses great sensibility, except when it is the seat of inflammation, and then the whole canal is very tender. The mucous coat is disposed in the form of transverse rugæ, anteriorly and posteriorly, which, by unfolding, permit the distension of the vagina.

From the "*cul de sac,*" at the inner extremity of the vagina, the mucous membrane is reflected down upon the projecting cervix uteri, and exhibits peculiarities of which I shall speak presently. In addition to its proper tissue and mucous coat, the vagina has some muscular fibres surrounding its orifice, which have received the name of constrictor vaginæ, and which serve to contract the orifice, and to draw down the clitoris. The vagina, in common with the vulva, is abundantly supplied with bloodvessels from the internal iliac arteries, and with nervous filaments from the pudic nerves. The lymphatics, which are very numerous, are derived from the hypogastric plexus. The *use* of the vagina is twofold; first, for copulation, and secondly, for the transmission of the fœtus; and, to facilitate the latter process, the inner membrane, which in its ordinary state secretes just enough mucus to lubricate its surface, during labour secretes it most profusely.

It has been established by the observations of Whitehead, Tyler Smith, and others, that the vaginal mucus is acid, thus differing from that of the uterus, which is alkaline.

Abnormal deviations.—The vagina varies much in length, as already stated: its width differs equally in different subjects; it may be so narrow as to render intercourse difficult and painful; its exit may be closed by the hymen, or by a membrane higher up; its sides may be adherent, or the seat of cicatrices or callosities; or it may be altogether wanting.

Of course, occlusion or absence of this canal will prevent the escape of the menses, and render copulation impossible, constituting one cause of sterility; but though a partial closure may impede intromission, it does not render impregnation impossible. I may add, that the narrowness or width of the canal is no proof of virginity, or the contrary; for M. Parent-Duchatelet states, that in many of the younger prostitutes of Paris it was wide and dilated; whilst in others, who had followed their degrading pursuits for twenty years, it might have been mistaken for the vagina of virgins. Dr. Montgomery has pointed out, what most practitioners must have observed, how very quickly, after delivery, the vagina recovers its usual size and tone.

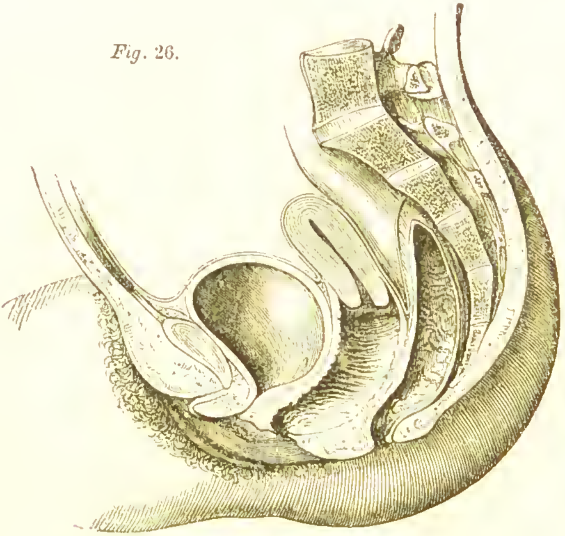
The vagina is also very obnoxious to attacks of acute and chronic inflammation, and their consequences; to lesions of nutrition, and to specific and malignant diseases.

CHAPTER VI.

OF THE INTERNAL ORGANS OF GENERATION.

According to the arrangement I have proposed, our next subject is the *formative*, or *internal* organs of generation. But before we proceed to take them in detail, it will not be unprofitable to direct the attention of the student to the relative situation of the pelvic viscera, as shown in the next woodcut.

Fig. 26.

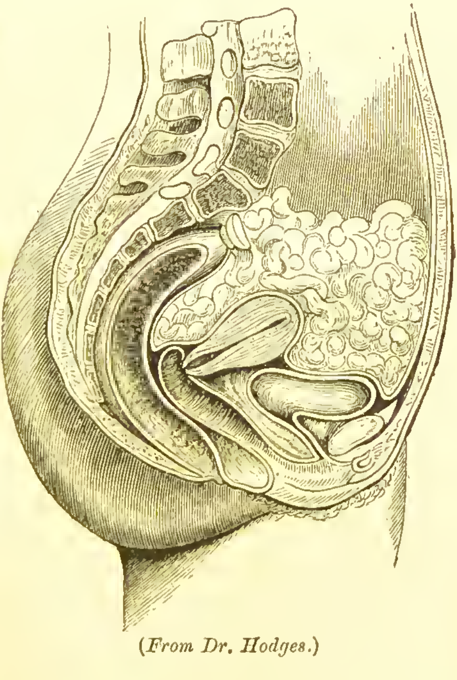


(*From Houston.*)

Proceeding from before, backwards, we find the urethra running in an oblique direction, antero-posteriorly, and from below, upwards, under the arch of the pubis, and then merging in the bladder, which, when distended, rises about half its height above the symphysis pubis. Below the urethra, but with an interval between them, is the vagina, running its oblique course to the os uteri, which is a little above the level of the pubes. The position of the uterus is not vertical, but inclining a little forward, with its fundus above the level of the bladder. The peritoneum is reflected from the abdominal parietes, on the fundus and posterior wall of the bladder down to the commencement of the cervix uteri; from whence it passes over the anterior surface, fundus, and posterior surface of the uterus, and on to the posterior wall of the vagina, down to about an inch below the level of the os uteri, from whence it is reflected upon the rectum. The latter organ lies between the uterus and the sacrum, and a little to the left side of the uterus.

But such a figure as the preceding gives quite an incorrect notion of the position and relations of the different organs in the living subject. This one, from Dr. Hodges, modified a little, is, I think, much nearer the truth.

Fig. 27.



(*From Dr. Hodges.*)

Let me remark: 1. The curve of the lumbar vertebræ, throwing back the sacrum, and bringing the anterior surface of the symphysis pubis nearly horizontal. 2. The axis of the uterus in accordance with the axis of the upper strait, and at something like a right angle with the axis of the vagina. 3. That the vagina would be more accurately represented by a close double line, inasmuch as its anterior and posterior surfaces are always in contact. 4. Lastly, that these two last circumstances must exercise more influence in supporting the uterus and preventing its descent than has been supposed. Direct downward pressure would drive the cervix, not along the vaginal curve, but down to the coccyx. For the production of prolapse, the direction of the axis of the uterus must first be changed.

We may now pass on to the description of the uterus, fallopian tubes, and ovaries.*

The UTERUS is the receptacle provided for the nutrition, maturation, and, ultimately, for the expulsion of the fœtus. It is the largest of the generative organs, and is peculiar to the human female, though there is an approach to such an organ in the mammalia. It is a hollow symmetrical viscus, in shape somewhat triangular or pyramidal, resembling a flattened pear, but rounder posteriorly than anteriorly; situated, as we have just seen, in the centre of the pelvis, behind the bladder, above the vagina, below the small intestines, and in front of the rectum. For the convenience of description, anatomists ordinarily divide it into the *fundus*, or that part above a line drawn from the orifice of one fallopian tube to the other; the *cervix*, or the narrow and inferior part; and the *body*, or that part between the fundus and cervix. Dewees maintains that the cervix differs essentially, in structure and function, from the rest of the uterus. The microscopic researches of Dr. Tyler Smith have shown certain peculiarities of arrangement, and differences of structure, in its internal and external mucous membrane; its general structure is more dense, less vascular, and the menses are not excreted by this part. In the unimpregnated state it projects into the vagina about half or three quarters of an inch, the anterior lip being the lower.

The uterus gradually assumes its normal form during fœtal and infantile life. Dr. Rigby remarks, that it is at first divided into two cornua, and usually continues so until the end of the third month, or even later; he younger the embryo, the longer are the cornua, and the more acute the angle which they form; but even after this angle has disappeared, the cornua continue for some time longer. The uterus is at first of an equal width throughout; it is perfectly smooth, and not distinguished from the vagina, either internally or externally, by any prominence whatever. This change is first observed when the cornua disappear, and leave the uterus with a simple cavity. The upper portion is proportionally smaller, the younger the embryo is. The

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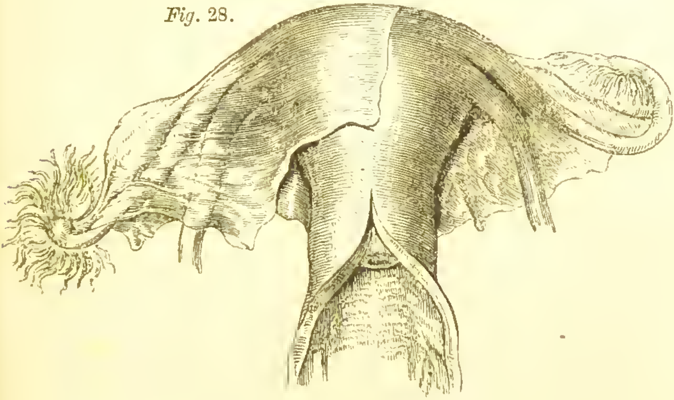
* I beg to refer the reader for more minute details than I have space for, to Dr. Farre's able article in Dr. Todd's Cyclopædia of Anatomy and Physiology, Parts 49, 50.

Fig. 28.



(*From Moreau.*)

body of the uterus gradually increases, until, at the period of puberty, it is no longer cylindrical, but pyriform. Even in the full-grown fœtus the length of the body is not more than a fourth part of the whole uterus; from the seventh to the fourteenth year, it is only a third; nor does it reach half until puberty has been fully attained. The os tineæ, or os uteri externum, first appears as scarcely a perceptible prominence, projecting into the vagina. The parietes of the uterus are thin in proportion to the age of the embryo. They are of equal thickness throughout, at first; at the fifth month, the cervix becomes thicker than the upper parts; between five and six years of age, the uterine parietes are nearly of an equal thickness, and remain so until the period of puberty, when the body becomes somewhat thicker than the cervix.*

The adult healthy uterus may vary a little in size, but the following measurements, given by Dr. Burns,† are sufficiently accurate. "The length of the uterus, from the margin of the lip to the fundus, is two inches and three quarters; breadth between the insertion of the fallopian tubes, from two inches and three-eighths to two inches and five-eighths; the middle of the fundus rises a quarter of an inch above a line drawn from the insertion of one tube to that of the other; the commencement of the body is an inch and a quarter broad, its thickness is an inch; the whole of the wall is half an inch, but at the fundus it is seven-eighths, or one-eighth of an inch less. The thickness of that part of the cervix which projects into the vagina, including the coat of that canal which is reflected over it, is an inch and one-eighth; its breadth an inch and a quarter. The breadth of the termination or lips of the os uteri, an inch and one-eighth; thickness, including both lips, three-quarters of an inch. The length of the transverse chink, or os uteri, from three-eighths to half an inch; each lip is three-eighths of an inch thick, though the posterior is said to be the thinnest." "From the margin of the lip to the top of the cervix is an inch, but sometimes only three-quarters, or even less. From the top of the triangular cavity of the fundus to the end of the narrow cylindrical cavity of the body is an inch and one-eighth; the extreme breadth of the top of the cavity stretching from the entrance of one tube to that of the other is nearly an inch and a half.

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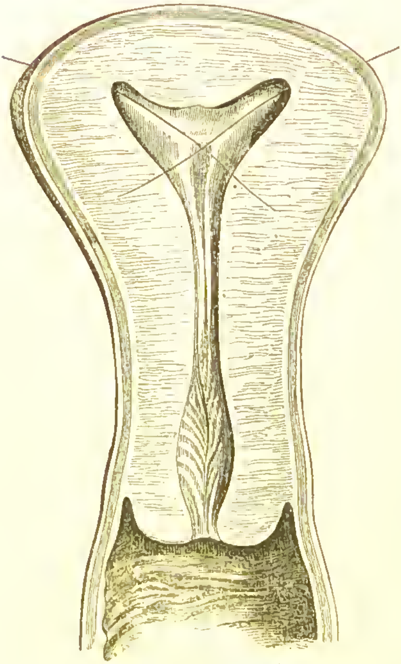
* Library of Practical Medicine, vol. vi.—Midwifery: p. 16.

† Principles of Midwifery, p. 50.

Fig. 29.



(*From Moreau.*)

According to the calculations of Levret, its superficies may be reckoned at sixteen inches, and its cavity at eleven-twelfths, or about three-quarters of a cubic inch. The weight of a virgin uterus, according to Meckel, is from seven to eight drachms; but after child-bearing it amounts to an ounce and a half.

The *Os Uteri*, or *Os Tincæ*, is situated at the lower part of the cervix, varying in form in different individuals. In virgins, or women who have not borne children, it is generally a circular orifice; after child-bearing it is sometimes a triangular opening like a leech-bite, in other cases a transverse chink or slit. It is generally about the calibre of a goose-quill, or rather less.

The *Canal of the Cervix* is from half to three-quarters of an inch long, leading from the os uteri; it first widens and then contracts again when it enters the cavity of the uterus, marking the *os uteri internum*, as it has been called. Between the os uteri externum and internum the mucous membrane is curiously disposed in rugæ, branching out from a central line; this has been called the *arbor vitæ*. The internal surface of this canal is thickly studded with mucous follicles, called *glandulæ Nabothi*, and which, after impregnation, secrete a thick mucus which blocks up the canal. The cavity of the uterus is of a triangular shape, the base being upwards; its dimensions have already been given.

Much difference of opinion has existed, and many discussions have taken place, as to the structures which compose the uterus; though of late years the opinions of authors are more harmonious. It possesses three distinct tunics: I. We have already seen that it is covered anteriorly and posteriorly by *peritoneum*, which is reflected laterally to the sides of the pelvis, near the sacro-iliac synchondroses, forming the *broad ligaments of the uterus*, or the *alæ vespertilionis*, on each side, containing the fallopian tubes, ovaries, and round ligaments. From their attachment to the pelvis they may, perhaps, serve as supports to the uterus, at least before conception. This serous covering is identical with the lining of the abdomen.

II. The *Middle Coat of the Uterus* is by some asserted, and by others denied, to be muscular; but this really appears to me little more than a dispute about the name, for those who deny its muscularity, admit that it performs the functions of a muscle. Mr. Rainey has examined very minutely with the microscope the middle coat of the uterus, and finds that it is made up of "fusiform nucleated fibres, contained in a matrix of exceedingly coherent granular matter. The average breadth of one of these fibres at its dilated or nucleated part is about $\frac{1}{4000}$th of an inch. Their length cannot be ascertained with certainty, as it is impossible to estimate the degree of curtailment which they suffer in being separated from the granular matrix in which they lie embedded."* The fibres belong to the class of non-striated or involuntary muscles. This middle coat differs in colour from ordinary muscle, being yellowish, with a faint tinge of red, like the middle coat of arteries, and it is much more dense than muscular tissue. It consists of fibrous structure, though it is not easy to trace the course of the fibres in the unimpregnated womb: however, when the uterus is enlarged from impregnation or other causes, it can readily be done, and they may be divided into several sets. The superficial set are very irregular, interlacing with each other in every direction, though with a general tendency from the fundus towards the cervix; but some regularity is observable in the deeper sets; for instance, there is a circular arrangement around the orifice of each fallopian tube, and at the os uteri; a layer diverging from the middle line anteriorly and posteriorly, and perpendicular bands descending to the os uteri. Among these more regular layers there are irregular fibres interspersed. From the middle coat fibres are sent off to the fallopian tubes and round ligaments.

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* Philosophical Trans. 1850. Part ii. p. 519.

III. The *Mucous Coat.*—A considerable number of distinguished foreign writers, among whom we find Morgagni, Assoguidi, Chaussier, and Moreau, have denied the existence of any lining membrane in the uterus, from the difficulty of separating and demonstrating it. I cannot understand this; for it has always appeared to me very evident, even in a state of health and quiescence, but still more when the seat of disease or pregnancy. Others, as Dewees, Boivin and Dugès, &c., do not question the presence of a lining membrane, but contend that it is not mucous, and apparently for the sole reason that one of its functions (menstruation) is not a function of mucous membranes. This objection, however, is refuted by the fact, that other mucous membranes do occasionally secrete a fluid apparently identical with the menses (vicarious menstruation); and we may add, that the uterine membrane presents the anatomical and histological characteristics of mucous membrane; that it secretes mucus, undistinguishable from that of the vagina. Its pathology also is that of mucous membranes.

For these reasons I have no doubt that the uterus is lined by mucous membrane, continued from the mucous membrane of the vagina after it covers the cervix uteri. Dr. Tyler Smith has published some very interesting and original microscopic researches on the structure of the mucous membrane covering the cervix and lining its canal, of which I shall give a brief abstract, especially on account of their bearing upon disease. The external mucous membrane consists of epithelium, basement membrane, fibrous tissue, bloodvessels, and nerves, like other mucous membranes. The special peculiarities are as follows: The epithelial layer is tessellated or squamous, and so arranged as to form a membrane of considerable thickness. Immediately beneath, the basement membrane covers the villi; each villus contains a looped bloodvessel, passing to the end of the villus, and returning to its base, where it inosculates with the bloodvessels of the neighbouring villi. The villi are everywhere covered by pavement epithelium, which renders the external surface smooth. The points of the villi are nipple-shaped, with a depression in the centre. From Dr. T. Smith's researches it appears doubtful if the external surface possesses any mucous or glandular follicles. Just within the os uteri a small extent of smooth surface is found, with villi covered by cylinder epithelium, like those of the intestines; these villi being three or four times larger than those of the external surface, and containing one or two looped vessels. Underneath the villi of this part, and externally, a dense fibrous and vascular tissue is found, mixed with involuntary muscular fibres and nerve fibres. Higher up, we find the peculiar structure of the cervical canal. It exhibits four columns of oblique, curved, or transverse rugæ, with four longitudinal grooves or ridges. Under the microscope, these rugæ, and the fossæ between, are found to be divided and subdivided many times, and these rugæ, and even the secondary septa, are covered with mucous follicles so numerously, that Dr. T. Smith calculates that in a well-developed virgin cervix uteri there must be 10,000 mucous follicles. The villi of this portion of the canal are numerous, and covered with cylinder epithelium. Thus we have a provision made for a very large extent of glandular secreting surface, in fact, Dr. T. Smith calls the cervix "an open gland," and he regards this as the principal seat of leucorrhœa. The normal mucus secreted by this portion is very viscid, and almost transparent. It adheres to the crypts and rugæ, and fills the canal of the cervix. It has an alkaline reaction, whilst that from the cervix externally is acid. It consists of minute corpuscles, caudate corpuscles, minute oil globules, and occasionally dentated epithelium, in a thick tenacious plasma, and its use, Dr. T. Smith thinks, is to close the canal of the cervix, and probably to afford a suitable medium for the passage of the spermatozoa into the uterine cavity.*

The *Arteries* of the uterus are four in number, furnished by the aorta, the hypogastric, and emulgent arteries. The two superior—the spermatic—arise from the aorta or emulgent arteries, and descend along the sides of the womb in a serpentine course; they are distributed to the upper part of the uterus, to the fallopian tubes and ovaries. The two inferior—the uterine arteries—given off by the hypogastric arteries, run along the sides of the uterus, to within a short distance of the lips, then divide, and supply the cervix and upper part of the vagina. The spermatic and uterine arteries anastomose freely with each other.

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* Med.-Chir. Trans., vol. xxxv. p. 377.

The *Veins* are more numerous than the arteries, are capable of greater distension, and lie superior to their corresponding arterial branches. They possess no valves, and, like the arteries, are of small size so long as the genital system is quiescent, but increase very greatly during pregnancy, when they form what have been called the uterine sinuses.

Some uncertainty has existed as to the *Nerves* of the uterus; but the researches of Drs. R. Lee, Robin, Snowbeck, and Hirschfeld, added to those of their predecessors, have rendered our information more complete. They arise from the aortic plexus, and from the hypogastric nerves and plexus, being a mixture of spinal and sympathetic nerves. I shall take the liberty of quoting Dr. Lee's account of a dissection of these nerves in the unimpregnated uterus: "The aortic plexus, the hypogastric nerves and plexuses, were all much smaller than in any of the gravid uteri I had previously seen. From the fore and middle part of the left hypogastric plexus a small branch passed down on the inside of the ureter, to the trunk of the uterine artery and veins, which was surrounded by a plexus of nerves, as in the gravid uteri before examined. From this, branches passed upwards to the fundus uteri, and a communication between these and the spermatic nerves was quite evident. From the left hypogastric plexus, numerous branches passed also directly into the uterus, without entering the ganglia at the cervix, which ramified on the peritoneum behind, and on the muscular coat. Branches from the posterior part of the hypogastric plexus communicated with some branches of the sacral nerves behind the ganglion. The trunk of the left hypogastric nerve was easily traced through the plexus to the upper part of the ganglion, which was remarkably large and distinct, and consisted of white and grey matter. Into the posterior part of the ganglion the third sacral nerve sent numerous branches. From the anterior margin of the ganglion a broad band of white and grey nerves passed round the outer surface of the ureter, and, after uniting with a similar band on the inside, sent branches to the plexus surrounding the uterine artery and vein, and also branches to the anterior surface of the uterus. Large flat nerves were seen passing off from the anterior border of the ganglion, to the bladder and vagina, and from its inferior and posterior borders to the vagina and rectum. A great number of nerves likewise passed off from the inner surface of the ganglion into the cervix uteri. The nerves sent off from the ganglion were both larger and more numerous than those which entered it. A great web of nerves was seen under the peritoneum, both on the anterior and posterior surface of the uterus, intimately connected with the nerves sent off by the ganglion and the hypogastric plexus."*

The *Lymphatics* are very numerous, though very small, in the unimpregnated uterus. The most numerous set of these vessels runs from the upper part of the body and cervix of the womb along with the spermatic vessels, and with those from the ovary, in front of the psoæ muscles, and terminates in the glands, in front of the aorta, vena cava, and lumbar vertebræ. Another set accompanies the uterine artery, and issues with the round ligament through the inguinal ring. A third set joins the lymphatics of the vagina, and enters the hypogastric plexus.

The lower portion of the uterus is within the reach of a vaginal examination, so that we can estimate its size, temperature, integrity, mobility, sensibility, &c.; by the use of the speculum we are able to ascertain its colour, the state of its surface; and by the endoscope the condition of the cervical canal and uterine cavity, and also, if necessary, to apply local remedies. Further information as to its condition may be obtained in many cases by abdominal manipulation; and, in the case of enlargements, by the application of the stethoscope. An examination "*per rectum*" is of value in certain diseases of the uterus, and especially of the ovaries.

Abnormal deviations.—1. The uterus may be altogether wanting; several such cases are on record.† 2. The canal of the cervix may be extremely narrow throughout, or it may be the seat of stricture. 3. It may be closed, either by the union of its sides, or by the mucous membrane being continued over the os uteri.

Fig. 30.

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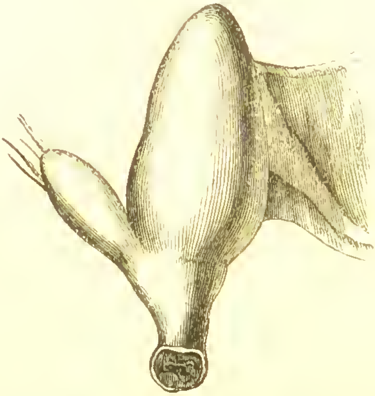
* The Anatomy of the Nerves of the Uterus, by R. Lee, M.D., &c., p. 7.

† Kussmaul has published a volume devoted to these and analogous deviations; see also cases by Dubois, Lancet, Dec. 8, 1855.

4. The uterus may be malformed; and it is remarkable that these malformations, which are owing to an arrest of development, appear to reproduce the analogous organs of lower classes of animals; for instance, the *double uterus* (fig. 30), resembles in some degree the tubular oviduct of birds; it opens by two ora uteri into the vagina; or both the uteri and vaginæ may be distinct.[*] In a very remarkable case of this kind, related by Dr. Roberts,[†] one os uteri was imperforate, and the menses were accumulated by the other. Menstruation took place regularly.

Fig. 31.



The *uterus bicollis* (fig. 31) exhibits two bodies with but one os uteri, and resembles the organ of some rodentia and carnivora.

Again, the junction of the cornua may take place higher up, constituting the *uterus bicorporeus;* here the lowest part of the body of the uterus is single, and the upper double.

In the *uterus biangularis* the body of the womb is tolerably well formed, and terminating in cornua, as in the monkey tribes. Several intermediate stages of this progress, from the lowest to the highest form of a single uterus, have been noticed, but I shall only add two more illustrations; one when the uterus is double, opening by two orifices into two separate vaginæ (fig. 32), and another when the uterus was separated into two cavities by a septum, but having only a common opening inferiorly (fig. 33).

These congenital malformations are by no means very rare; Dr. Cassau collected forty-one examples, and many others have since been recorded.

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[*] Amer. Journ. of Med. Science, p. 331. Oct. 1852.

[†] Association Journal, July 22, 1865.

The effect of the three first abnormal deviations will be either the absence of menstruation, and consequent sterility, or inefficient or painful menstruation. The deviations from arrest of development may exert no injurious influence upon menstruation or conception, but they have been adduced to explain the phenomenon of superfœtation, as it is pretty certain that a double conception may take place; and, when it is single, the vacant cavity is lined by decidua. In addition, the uterus is the seat of many forms of disease.

Fig. 32.

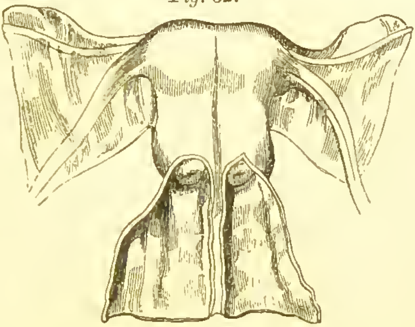
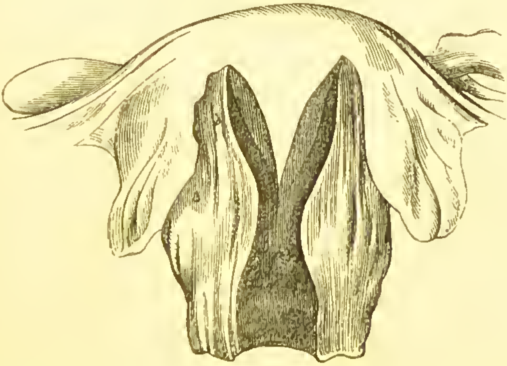


Fig. 33.



The FALLOPIAN TUBES are two cylindrical canals, about four inches long, proceeding from the upper angles of the uterus. They are contained in the superior and lateral folds of the broad ligaments. Internally, they open obliquely into the uterus, at which point the canal is narrow; it afterwards expands, and then again contracts towards its external termination, where it is open to the abdomen. Externally, the tubes are of equal thickness for about three inches and a half, when they expand, and terminate in a fringed process, called the *fimbriæ*, or *morsus diaboli*, which is applied to the ovary during impregnation. The tubes are covered externally by peritoneum, beneath which is their proper tissue, with some circular and longitudinal fibres, derived from the middle coat of the uterus. Internally, they are lined by mucous membrane, disposed in longitudinal folds, the villi of which are highly developed after impregnation. The tubes share in the vessels and nerves by which the ovaries are supplied.

Their *function* is perhaps the transmission of spermatozoa to the ovary in the first instance, and afterwards of the impregnated ovum to the uterus; in fact, they are the excretory ducts of the ovary.

Abnormal deviations.—The tubes, one or both, may be impervious, from disease, or as a congenital malformation. The closure of both of course entails sterility. They are also subject to inflammation and its consequences, and to malignant diseases.

I have already stated that the *round ligaments* are formed by fibres, derived from the middle coat of the uterus. Mr. G. Rainey asserts, that they are composed of striated fibres, and are of the nature of voluntary muscular fibre, and that their function is in some way connected with the act of coition.* M. Rau has also published an interesting paper on this subject.† He conceives that for two-thirds of their course, these fibres are a continuation of the muscular fibres, both superficial and middle, of the uterus. He admits the correctness of Rosenberger's description of the courses of the three bundles of muscular fibres that form part of the ligament, while in the inguinal canal. Some of the fibres proceed to the horizontal ramus and symphysis pubis. M. Rau thinks that the round ligaments exercise no function during the unimpregnated state of the womb; but, that towards the end of pregnancy, they contribute to give a forward tendency to the fundus uteri, and especially during the early part of labour.

The Ovaries are the essential organs of generation in the female; they are the "analogues" of the testes in the male, and up to the time of Steno, were called "*testes mulieris*." They are situated on each side of the uterus, to which they are attached by the posterior duplicature of the broad ligaments, hence called the *ligamentum ovarii.*

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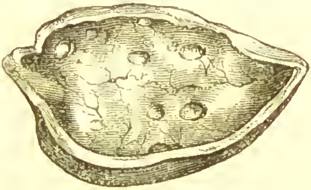
* Philosophical Transactions. 1850. Part II. p. 515.

† Zeitschrift für Geburtshülfe. July, 1851.

They are small oval flattened bodies, broader at the end distant from the womb; about an inch and a quarter or an inch and a half long, from half to five-eighths of an inch at their greatest breadth, and a quarter of an inch thick. They hang loosely in the pelvis, beneath and somewhat behind the fimbriated extremity of the fallopian tubes. Smooth externally in virgins, they become wrinkled in old age.

Their external covering is the serous membrane, constituting the broad ligament, in which they are completely enveloped, except at the part where the vessels enter. Underneath the peritoneum they possess a proper fibrous coat of dense structure, called the *Tunica Albuginea.*

Fig. 34.



(*From Montgomery.*)

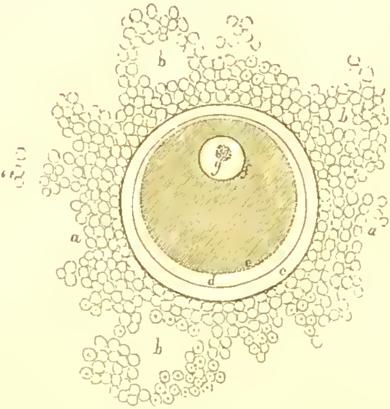
When laid open, we find their internal structure to consist of cellular tissue, permeated by numerous bloodvessels derived from the spermatic arteries, running tortuously across the ovaries in nearly parallel lines; and by nerves. Embedded in the cellular parenchyma of the organ, in the adult, a number (from 10 to 20) of small vesicles may be observed, which, though noticed by Fallopius and Vesalius, were more particularly described by De Graaf, and called after him, *Graafian Vesicles.*

To the naked eye they are not very numerous, but under a powerful microscope they appear to be innumerable; Dr. Wills Richardson showed me a minute portion magnified with a high power, and it literally appeared to contain hundreds of vesicles.

They vary in size from that of the head of a small pin to that of a small pea.

There is some difference of opinion as to the age at which these vesicles are developed: some say, about the period of puberty; others, among whom is Dr. Rigby, state that they make their appearance about the seventh year; but according to M. Negrier, in his "*Recherches sur les Ovaires*" they are to be found much earlier. He states that at birth the texture of the ovarian parenchyma is homogeneous, but that in the course of a year, an uncertain number of miliary granulations may be observed; after a short time, these granulations are surrounded by an opaque zone, and a small vesicular globule, whose walls are formed by this zone, is annexed to the granule. This globule contains a vesicle (the Graafian) formed by two membranes, concentric and in contact. At the age of ten or twelve, certain of the vesicles increase in size, and cease to be transparent, because of the interposition between the two membranes of a grey pulpy matter. At the same time, the vesicles go on increasing more rapidly than the cavity in the ovarian tissue in which they are lodged, which gives to them a compressed and slightly corrugated appearance. The grey pulp of the vesicle is gradually changed to a yellow colour, marking the epoch of puberty. The vesicles are connected to the part in which they are embedded by cellular filaments, which become weaker in proportion to the age of the child. During early life the vesicles occupy the deeper parts of the ovary, but gradually approach the circumference; and, at the time when the pulp becomes yellow, some of them are in contact with the envelope of the ovary. I have condensed this account from M. Negrier, but am not able to decide upon its correctness.

Fig. 35.



(*From Barry.*)

Ovum of Rabbit.

aa. Discus proligerus.
bb. Pale oil globules.
c. Zona pellucida.
d. Vitelline membrane.
e. Vitellus.
f. Germinal vesicle.
g. Germinal spot.

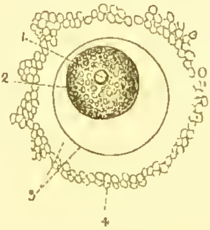
So much for the development of the Graafian vesicles: upon their intimate structure very great light has been thrown of late years by the labours of Baer, Rathke, Purkinje, Valentin, Wagner, &c., in Germany; of Prevost, Dumas, Coste, &c., in France; and of Allen Thompson, Wharton Jones, and Martin Barry, &c., in England. From their writings the following description has been gathered, which I believe to be correct, with the exception of a few minor points not yet settled.

The Graafian vesicle consists of an external and an internal membrane: the former (*tunic of the ovisac, Barry*) is extremely vascular; the latter (*ovisac, Barry*) is smooth and velvetty, deriving its vessels from the former. The cavity enclosed by these membranes is far from being filled by the ovum; it contains, besides, a whitish or yellowish albuminous mass, which consists chiefly of granules, from $\frac{1}{200}$th to $\frac{1}{300}$th part of a line in diameter, connected together by a tenacious fluid, and forming the *tunica granulosa* of Bischoff, Wagner, and Barry. Its density is unequal; towards some part of the periphery of the vesicle these granules are accumulated in a disk-like form, making a slight prominence in which is a depression.

The disk and prominence are termed by Baer the *discus proligerus* and *cumulus.* Dr. Barry has also observed certain granular cords, resembling the chalazæ in the egg in appearance and function, and which he has called the *retinacula.* In the depression in the cumulus is lodged the ovum (*ovulum, Baer*), the discovery of which by Professor v. Baer explained satisfactorily the small size of the ova observed in the fallopian tube by De Graaf, Cruikshank, and Haighton, compared with the Graafian vesicle in the ovary. The ovum is surrounded by a thick white ring, which has been called *zona pellucida,* but which Valentin and Wagner conceive to be a membrane; internal to which we find a granular layer, the *vitellus,* the larger granules of which are superficial and compact, whilst internally it is a clear albuminous fluid, almost devoid of granules.

Embedded in this vitellus, but nearer to its circumference than centre, is the *germinal vesicle,* or *vesicle of Purkinje,* a very important part of the ovum. It was first discovered in eggs by Purkinje, but in mammalia by Wharton Jones, Coste, Valentin, and Bernhardt. It appears like a clear ring of very small size, measuring in man and mammalia at most $\frac{1}{60}$th part of a line in diameter. Upon the surface of the germinal vesicle a dark spot was discovered by Wagner, and called by him *macula germinativa.* "It is almost always seen as a simple rounded body from $\frac{1}{200}$th to $\frac{1}{300}$th part of a line in diameter; it is very rarely observed double or as an aggregate of granules, which, however, is sometimes the case in immature ova."

Fig. 36.



Ovum of Man, *from Bernhardt.*

1. Germinal vesicle.
2. Vitellus.
3. Chorion. (Zona pellucida?)
4. Tunica granulosa.

It may serve to render this minute description more intelligible to the student, if I give the summary of Valentin and Barry of the contents of a Graafian vesicle:

Valentin.	Barry.
1. An external membrane (yolk-bag).	1. Tunic of the ovisac.
2. Fluid contents (yolk).	2. Ovisac.
3. Layer of granules which form the disk (blastoderma).	3. Membrana granulosa, in which are found—
4. Ovum or ovulum, in which is to be distinguished—	4. Tunica granulosa and retinacula (disk and cumulus of Baer).
5. An outer membrane.	5. Zona pellucida.
6. A granular layer, internal to it.	6. Membrana vitelli.
7. A transparent half-fluid content.	7. The yolk.
8. The germinal vesicle.	8. Germ vesicle, with Wagner's germinal spot.

Dr. Barry states that the tunic of the ovisac is not always present; but that, when it is, it is furnished by the ovary. The order of time in which the parts are formed is thus given by him:—1, the germinal vesicle with its contents; 2, an envelope consisting of peculiar granules and oil-like globules; 3, the ovisac; 4, the yolk; 5, the membrana vitelli; 6, the zona pellucida; and 7, the tunic of the ovisac, tunica granulosa, retinacula, and membrana granulosa.

Abnormal deviations.—One or both ovaries may be absent, or atrophied. There may be few or no Graafian vesicles, or they may be morbidly changed. The ovaries may also be the seat of inflammation, dropsy, malignant diseases, &c.

The absence or disorganization of both ovaries, or of all the Graafian vesicles, entails sterility; but conception is not impossible so long as a portion remains healthy.

Having thus minutely investigated the anatomy of the sexual system in the female, we may now proceed to consider its functions.

PART II.

PHYSIOLOGY OF THE ORGANS OF GENERATION.

CHAPTER I.

PHYSIOLOGY OF THE UTERUS AND OVARIES—1. MENSTRUATION.

The generative organs of the female are in a state of activity only during the prime of life, embracing a period of about thirty years, and during this time, the most remarkable characteristic of their functions is their periodicity.

It is impossible to separate the functions of the uterus from those of the ovary, because in each we may discern a combined influence. Those offices which are peculiarly uterine may thus be enumerated:—1, the secretion of mucus; 2, secretion of the menses; 3, formation of decidua; 4, reception and nutrition of the fœtus; and 5, the expulsion of the fœtus. From the ovary, on the other hand, is derived 1, the effective stimulus to menstruation, and 2, the fecundated germ; so that we see that the effective co-operation of both the organs is necessary for the fulfilment of either of the three great functions of the uterine system,—viz., Menstruation, Conception, and Parturition. We shall consider these functions in order.

Menstruation.—In healthy women at the period of puberty a certain amount of sanguineous fluid is eliminated by the uterus, and escapes from the vagina, every month; this is termed the *catamenia*, or *menses*, and the function itself, *menstruation.*

That it is excreted by the uterus, has been ascertained in cases of prolapse and inversion of the organ; and that it is really a secretion by its lining membrane, and not blood mechanically filtered through it, is, I believe, now generally admitted.

A female in whom this discharge recurs *at the usual periods, in the usual quantity*, and of the *usual quality*, is said to be "*regular;*" and various conventional phrases are in use to avoid a more direct reference, as "being regular," "unwell," &c.

The occurrence of menstruation defines the period of puberty, at which the girl becomes a woman, and capable of conception; as its cessation terminates the prolific period of female life. In Great Britain this generally happens between the ages of thirteen and sixteen, although we meet with cases of earlier and later puberty, dependent, probably, upon peculiarity of constitution, habits of life, pursuits, &c. A case is recorded by Dr. Wall, in the second volume of the Med.-Chir. Trans. of a child who menstruated at nine months old, and continued to do so regularly afterwards. There is another instance in the American Journ. of Med. Science, for Nov. 1832, by Dr. Le Beau, of New Orleans, of a child born with the marks of puberty, in whom the catamenia appeared at three years of age, and recurred regularly. I find also a case by Mr. Embling,[*] of menstruation at less than three years old; one by Dr. Dieffenbach[†] at nineteen months old; one by Dr. Catals[‡] at six years old; one by Dr. Carus[§] at two years old; one by Mr. Whitmore[‖] of a child who menstruated from a few days after birth, till it died at four years of age; one by Dr. Lenz[¶] at eighteen months; and one by M. Gruere[**] at one year old. In all these cases menstruation not only commenced at that age, but continued to return at the regular periods. Additional examples may be found in the writings of Lobstein, Meyer, Ploucquet, &c. &c.

Mr. Roberton, of Manchester, has stated the age at which it commenced in 450 cases.[††]

10	menstruated	for the first time at	11	years of age.
19	,,	,,	12	,,
53	,,	,,	13	,,
85	,,	,,	14	,,
97	,,	,,	15	,,
76	,,	,,	16	,,
57	,,	,,	17	,,
26	,,	,,	18	,,
23	,,	,,	19	,,
4	,,	,,	20	,,

Which gives the mean age 15·204 years.

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[*] Lancet, Jan. 29th, 1848.

[†] Meckel's Archiv für Anat., p. 367.

[‡] Journal de Méd. et de Chir., vol. ii. p. 37.

[§] Ed. Monthly Journal, 1842, p. 1050.

[‖] Northern Journal of Med., July, 1845.

[¶] Casper's Wochenschrift, Oct. 3, 1840.

[**] Journ. de Méd. et de Chir. Pratique, May, 1842.

[††] Physiology and Diseases of Women, and Midwifery, p. 29.

Mr. Whitehead, in his work on Abortion, gives the following table, showing the age at which puberty was established in 4000 individuals in Manchester :—

At the age of	10	years	9	first menstruated.
,,	11	,,	26	,,
,,	12	,,	136	,,
,,	13	,,	332	,,
,,	14	,,	638	,,
,,	15	,,	761	,,
,,	16	,,	967	,,
,,	17	,,	499	,,
,,	18	,,	393	,,
,,	19	,,	148	,,
,,	20	,,	71	,,
,,	21	,,	9	,,
,,	22	,,	6	,,
,,	23	,,	2	,,
,,	24	,,	1	,,
,,	25	,,	1	,,
,,	26	,,	1	,,

These tables seem to bear out the inference of Mr. Roberton, that the "natural period of puberty, instead of being the fourteenth or fifteenth year, occurs in a more extended range of ages, and is more equally distributed throughout that range than authors have alleged." It is influenced, however, by many causes; for example, it is earlier in towns than in the country, for M. Brierre de Boismont found the mean age of first menstruation to be fourteen years six months in Paris, and fourteen years ten months in the country, and fourteen years nine months in small towns.

Again, the rank of life and degree of civilization exert an influence, for the same writer states that he found the mean age in 171 of the poor to be fourteen years ten months; in 135 of the comfortable working classes to be fourteen years five months; and in 53 daughters of the rich and noble, thirteen years eight months.

By most writers, a very great effect is attributed to climate. Menstruation, it is said, commences much earlier than the period I have named in hot climates, and much later in cold ones. Women are stated to be mothers very commonly at ten or twelve years old in the East, and to cease bearing at twenty-five or thirty; and that in Lapland and other northern climes, they do not begin to menstruate till about twenty or twenty-four, and continue until sixty years of age. Now, without denying the occurrence of such cases, I do not believe that either extreme is very common, and although there is a difference according to climate, that difference is far less than has been supposed.

Thus Mr. Roberton, in his valuable researches, gives it as the result, that in Labrador and northern Europe, the period of first menstruation is very nearly the same as in this country, nor does the discharge continue later;* whilst in India, although the average age, in his return, is earlier, it is probable that puberty does not actually appear earlier there than here.†

Dr. Tilt, who has published a valuable table on this subject, finds the mean age for the first menstruation in hot climates, out of 629 cases, to be thirteen years and sixteen days; out of 5775 cases, in temperate climates, fourteen years four months and four days; out of 4018 cases, in cold climates, fifteen years ten months and five days.‡

In these countries the discharge continues until the age of forty-five or fifty; in some cases it ceases earlier, in others it continues longer; generally according to the age at which it commenced. From Mr. Roberton's work I extract the periods at which it ceased in 77 individuals.§

In 1	at the age of	35	In 26	at the age of	50
4	,,	40	2	,,	51
1	,,	42	7	,,	52
1	,,	43	2	,,	53
3	,,	44	2	,,	54
4	,,	45	1	,,	57
3	,,	47	2	,,	60
10	,,	48	1	,,	70
7	,,	49			

The period of its cessation is called by women the "*time, or turn of life;*" and is preceded by irregularity and occasional interruption. It is looked upon as a critical period from the supposed liability to serious attacks and the greater mortality; but the researches of MM. Benoiston de Chateauneuf, Bellefroid, &c., have shown that the mortality at this period of female life is not greater than amongst males at the same age.

As the name (*menses, catamenia*) implies, the discharge recurs every month; that is, deducting four or six days for the time of its flow, every twenty-seven or twenty-eight days. Mr. Roberton found that, out of 100 women, 61 menstruated every month, 28 every three weeks, 10 at uncertain intervals, and one, a healthy woman, æt. twenty-three, every fortnight. The shortening of the interval of twenty-six or twenty-eight days is a deviation from functional integrity, owing, most likely, to habits of life, impaired constitution, &c. Dr. Gall made some very curious observations, from a journal which he kept of the periods of menstruation in different women: "It resulted" (I quote from Elliotson's Physiology, not having the original at hand) "that women are divided into two great classes, each having a different period. The women of the same class all menstruate within eight days: after this time an interval of ten or twelve days follows, during which very few women menstruate. At the end of the ten or twelve days begins the period of the second great class, all the individuals of which also menstruate within eight days." Admitting exceptions to the rule, Dr. Gall says that it applies generally to all parts of Europe.

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* Physiology and Diseases of Women, &c., p. 56. † Ibid. p. 127.

‡ Edinburgh Monthly Journal of Med. Science, Oct. 1850, p. 294.

§ Phys. and Dis. of Women, and Mid., p. 185.

The duration of each menstrual period varies from three to six days, or even longer. The quantity which escapes each time is from four to eight ounces, varying according to the temperament or constitution of the individual. It is not discharged at once, but slowly and gradually. As to the character of the secretion, it greatly resembles venous blood, being of a dark-red colour, thin, and either without odour, or with a very faint one. It consists of blood without its fibrine in perfectly healthy menstruation. It is found to redden litmus paper, and to contain phosphoric and lactic acids, with some phosphate of lime.

The *symptoms* which precede and accompany the first menstruation are very slight in some cases, well-marked in others. There is generally a degree of languor and lassitude, fatigue after exertion, inequality of spirits, dark shade under the eyes, headache, sometimes pain in the thyroid gland, pain in the back, weight and aching in the pelvis and down the thighs, &c.; occasionally there is a smart attack of fever. If the discharge takes place, most of these symptoms disappear, and the female merely complains of weakness, and exhibits pallor of countenance.

Or the menstrual secretion may make its appearance quite suddenly, without any previous suffering or any symptom likely to attract attention, and in such cases it is a cause of considerable alarm, and it may be that steps are taken to suppress it by the girl herself, which may be very injurious.

Or the symptoms enumerated may occur, and pass off once or twice without the appearance of the menses, or *with a white dis-*

charge only. This may generally be remedied by an improvement in diet and tonics at the approach of the next menstrual period.

Sometimes the colour of the discharge is light at first, growing deeper each period. During its flow, the skin exhales a peculiar odour, the appetite is diminished, and often capricious, and frequently sympathetic pains are felt in the breasts, which may enlarge during that period. There is a case* related of a woman whose breasts secreted milk after each menstrual period, and I have myself seen similar cases. The amount of suffering differs, as I have said, in different women, according to some peculiarity of constitution, and according to the degree of care and good management bestowed upon them during the earlier periods. In some it is never attended by pain or distress, beyond a slight indisposition to exertion; in others, more or less pain and uneasiness attend each period, whilst in some women it always amounts to dysmenorrhœa, and is accompanied with great suffering, debility, or feverishness. I may add that the first menstruation is not necessarily a type of the subsequent periods. The more perfectly the function is performed, the less is the distress.

The effects of the development of this function upon the body and mind of a young girl are very striking. The figure enlarges, becomes rounder and more fully formed, the pelvis expands, the mammæ enlarge, and the general bearing becomes graceful and dignified. The mental change is as remarkable: the pursuits of girlhood are exchanged for more womanly interests; and a more exquisite perception of her position and relations results in higher enjoyment, veiled by a more delicate modesty. These changes are rapid, and, occurring at this peculiar period, doubtless fit the individual for the more perfect fulfilment of the duties about to devolve upon her.

From the importance of this function, a few brief directions as to the management of young girls at its commencement will not be out of place. And first, I would protest against the demand not unfrequently made upon us, that at the usual age we should endeavour to bring on menstruation in cases in which it has not appeared. The intimate dependence of this function on the general development of the body ensures its establishment at the proper time in the majority of cases, and in those where it is tardy it most frequently arises from causes over which we have no immediate control, and to attempt to interfere will probably end in mischief. The cases suitable for our medical interference we shall enumerate by-and-by.

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* British and Foreign Med. Review, Oct. 1840.

I do not think that girls should be instructed beforehand as to the occurrence of this discharge, or certainly, if it be done, it should be in the most general manner; but I think we may safely leave this to the watchful care of the mother.

Warm clothing and rest are very necessary. The custom of wearing drawers, which is becoming general, will, I have no doubt, contribute to the more perfect performance of this function, and to the health of young women generally.

During menstrual periods, especially the earlier ones, the girl should be much restricted in her exercise, and be prevented from violent or rapid movements. And especially she should guard against cold. Exposure to cold air, too liberal use of cold water in washing, bathing the feet in cold water if it be summer, may inflict permanent injury.

During the intervals, the girl may resume her ordinary habits; and whatever is calculated to strengthen the constitution and to improve the general health, such as fresh air, exercise, bathing, and good diet, will also tend to render complete and permanent the healthy performance of this function.

This is scarcely the place to indicate the moral management of young girls, but I may just mention that, as this is the most susceptible age for receiving impressions, it is desirable that they should be of a healthy kind; that all such as enervate, all those which appeal to the imagination—novels and poetry, which make life a dream of idle fancy or of affection unconnected with duty—should be controlled, if not avoided. As the girl is becoming a woman she should be treated as such, and true views of life and duty, as well as of pleasure, be laid before her. Late hours, excitement, balls, exhibitions, &c., should be made the exception, not the rule, remembering always, that while softness, and affection, and grace, are the natural attributes of woman, it is the province of a wise educator to instil principles, and strength, and practical wisdom.

The next very important question is the *condition of the organs during menstruation*. By a great number of writers the attention has been limited to the uterus, which, being the seat, was regarded as the chief, if not the sole organ involved. Upon careful investigation, we find that the *uterus* is congested during menstruation; its vessels are distended with blood, its substance more flaccid than usual, of a more decided pink colour, and its lining membrane of a deep red, studded with bloody points, and covered with menstrual fluid. The cervix, however, participates but slightly in the increased vascularity, and its lining membrane is scarcely altered in colour, so that the *os uteri internum* is marked by the abrupt termination of the dark colour of the lining membrane of the body. On making a vaginal examination, we find the cervix softer, more puffy, and slightly swollen, and the os uteri more open, than at other times. The *fallopian tubes* are also somewhat more vascular than usual.

A very careful examination was made by Dr. Janser of the organs of generation of a girl who was murdered four days after menstruation, and he thus describes the state of the uterine mucous membrane: "It was much swollen between the body and neck. In the uterus itself it formed a velvety membrane, glossy and brilliant, easily detached with the handle of the scalpel, and presenting a fine network of vessels. This mucous membrane was evidently thickened: it was composed of the uterine glands, ranged perpendicularly alongside each other, and fitted with cylinder epithelium not ciliated. The structure between the uterine glands was composed of a network of delicate fibres, of some nucleated cellular fibres, and of amorphous tissues. The surface of the uterus was covered with a thin layer of mucus, and lined with cylindrical epithelium, without cilia. The orifices of the fallopian tubes were open. The vaginal mucous membrane was pale, but was only covered with a thin layer of mucus, containing epithelial cells." The writer adds, "It results from this observation that the mucous membrane of the uterus presents, during menstruation, characters analogous to those which exist during gestation, such as the hypertrophy of the uterine follicles, and the disappearance of vibratile cilia."*

M. Pouchet conceives that not only does this peculiar change in the mucous membrane take place, but that a deciduous membrane is formed and discharged each month. Dr. Lee believes it to be a frequent occurrence with unmarried females; Dr. J. C. Dalton thinks its periodical occurrence very probable. Professor Bischoff's examinations did not confirm this opinion. Dr. Tyler Smith and others believe that the mucous membrane is exfoliated every month, but more accurate observation is necessary to confirm this opinion.

These changes rapidly subside when the function ceases, and the parts return to their ordinary state.

A still more essential question, however, is the state of the ovaries, and the influence they exert upon menstruation. From time to time it has been suggested that these organs were of greater importance to this function than was generally admitted, or even of equal importance to the uterus itself. A reference of this kind is made by Dr. Friend, in his "Emmenologia;" and Dr. Power goes further, and attributes menstruation entirely to the action of the ovaries: Dr. Vaughan also regarded the menses as a secretion dependent upon the ovaries; and other authorities might be adduced. Indeed, there are certain facts which cannot but lead to an admission of a certain influence exerted over menstruation by these organs: for instance, it is well known that they participate in the congestion which is observed in the uterus at the monthly periods; again, when the ovaries have both been atrophied or diseased, as noticed by Morgagni and Frank; or when one was congenitally absent and the other disorganized, as in a case related to me by Dr. Montgomery, the secretion of the menses has been prevented altogether, or it has ceased prematurely. Moreover, when the uterus is absent but the ovaries present, the menstrual *molimen* and other sexual peculiarities are observed. Lastly, when the ovaries have been removed, as in the case mentioned by Mr. Pott, menstruation ceased entirely.

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* Med. Annals, vol. xiii. part iv. London Journal of Med., April, 1850.

These considerations alone would, I think, be sufficient to justify the opinion that, although the uterus be the seat, and its lining membrane the secreting agent in the process, yet that the impulse or stimulus upon which the function depends is in some way or other derived from the ovaries.

Nor is this inference weakened by the changes which are observed in the ovaries during menstruation, which may throw some light also as to the nature of the stimulus. For almost all the accurate information we possess, we are indebted to the recent researches of Drs. Girdwood, Lee, Ritchie, Knox, Renaud, Dalton, &c., in this country and America, and Pouchet, Negrier, Gendrin, Bischoff, Raciborski, Chereau,* &c., on the Continent, although the main fact established by their labours was cursorily noticed by Mr. Cruikshank so long ago as 1797: "I have also," he says, "in my possession the uterus and ovaria of a young woman, who died with the menses upon her. The external membranes of the ovary were burst at one place, from whence I suspect an ovum escaped, descended through the tube to the uterus, and was washed off by the menstrual blood." Several similar observations have been published by Dr. Lee in the Cyclop. of Pract. Medicine, and since in the Med.-Chir. Transactions; Mr. Girdwood and M. Gendrin have each added five cases, and M. Negrier five more, of the same kind. All the observations agree, that, in females dying during or soon after menstruation, a small irregular rupture or cicatrix was found in the coats of the ovarium (fig. 37), and that this communicated with the remains of one of the Graafian vesicles; from which Dr. Lee concludes that it is "extremely probable that all the phenomena of menstruation depend upon, or are connected with, some peculiar changes in the Graafian vesicles, in consequence of which an opening is formed in the peritoneal and proper coats. Whether an entire vesicle, or only the fluid it contains, escapes through this opening at the period of menstruation, further observations may hereafter determine."

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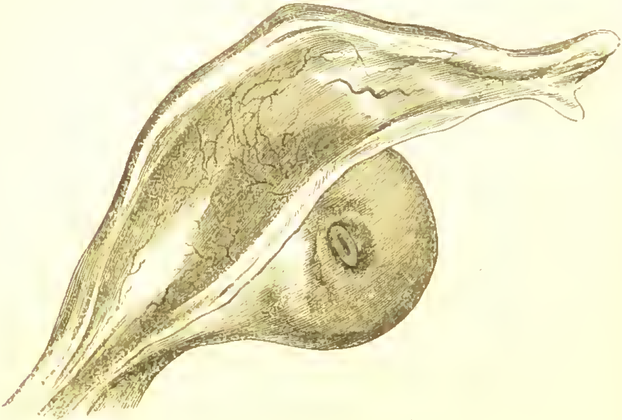
* See Müller's Physiology: Supplement, p. 45 *et seq.*

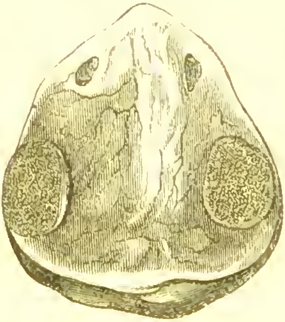
Fig. 37.



(*From Montgomery.*)

The changes which take place in the vesicle are thus stated by M. Negrier: an afflux of transparent fluid occurs in the vesicle, distending and ultimately causing its rupture at the least resisting part, which corresponds to the surface of the ovary. This opening is cicatrized, at least externally, in about eight or ten days, so as to prevent the escape of the blood which proceeds from the lacerated vessels of the vesicle, and, in consequence, a clot is frequently formed in the capsule of the

Fig. 38.



(*From Montgomery.*)

vesicle (fig. 38). Sometimes it contains a serous fluid, colourless, or tinged with blood.

A very valuable prize essay on the subject has lately been published by Dr. J. C. Dalton,* in which he records eleven cases in which he observed these menstrual corpora lutea, and gives very minutely the changes which take place in them. He thinks the exact period of the menstrual flow, at which the vesicles rupture, variable: sometimes during the flow, in other cases, as stated by Bischoff, Pouchet, and Raciborski, at the termination. The appearance of the corpus luteum will depend upon the extent of the rupture, and the amount of hæmorrhage into the cavity. "As to the seat of the peculiar growth which characterizes these bodies," he considers it to be the proper membrane of the vesicle hypertrophied, and that the proligerous disc, and a considerable portion of the membrana granulosa are expelled with the ovum. "The new growth or deposit of yellow matter, when examined under the microscope, is seen to consist of an abundance of peculiar, irregular-shaped granular cells, varying in size, and sometimes enclosing minute, opaline, yellowish globules, like oil. The contour of the cell wall can in most instances be completely traced throughout; but in some instances it is indistinct in certain parts of the circumference. There are also to be seen in the field of the microscope a few oil globules similar to those in the interior of the cells, but for the most part of larger size." Recent researches seem to show that the development of fatty matter is an early step in the death and removal of tissues; and it is possible that a similar step may thus be observed in these menstrual corpora lutea, for we find them attain their maximum in the course of three weeks, then rapidly retrograde until the yellow matter diminishes in size, becomes softer and more friable, and at length merely exhibits a cicatrix, with a small, faint yellow spot. Dr. Dalton agrees with those already mentioned, who regard the discharge of ova as an essential part of menstruation.

I may add here the examination of the ovary in the case related by Dr. Janser, to which I have already referred. "The surface of the left ovary presented a deep red spot, surrounded by finely injected vessels. This spot was formed by a small globular mass, embedded in the ovary, and of an intense red through its whole thickness. The mass in question was separated from the tissue of the ovary by a thin yellow envelope, and was composed of fibres like those of areolar tissue, arranged in superimposed layers. The yellow envelope was formed by the same kind of fibres, among which there was a pretty considerable quantity of fat, not contained in cells. Near this body, there was seen a small yellow, spherical, nodulated mass, composed of areolar tissue and fat. The right ovary contained two yellow bodies."* No ovule was found; but the examination was four or five days after menstruation.

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* On the Corpus Luteum of Menstruation and Pregnancy, p. 45.

M. Bischoff has published the minute examination of thirteen cases, in which the clot was found in the place of the discharged ovum, the rent in the coats, cicatrices, and marks of former ova, congestion of the uterine mucous membrane, but neither decidua nor ovule. There are but two or three cases (by Hyrtl and Letheby) in which the ovum has been found.

If the reader will carefully compare the cases here quoted, and those recorded by the authors mentioned, but which it would be out of place to detail more fully here, he will agree with me, I think, that they justify the following conclusions:—

1. That ovarian influence is necessary to menstruation: *a.* Because when the ovaries are congenitally absent, or have been removed, or have become disorganized, menstruation is absent or ceases. *b.* Because when the uterus is absent or has been removed, the ovaries being present, the menstrual molimen may still recur periodically. *c.* Because coincident with the commencement and cessation of menstruation we find corresponding organic changes in the ovaries.

2. We find that the ovaries do not contain a definite and limited number of Graafian vesicles, as Haller and others have thought, but a vast assemblage, according to the researches of Dr. Martin Barry, and the number of which vesicles may be increased, according to Dr. Ritchie.

3. In the ovaries of women who menstruate regularly, there may be observed a number of the Graafian vesicles, in different degrees of development, from the size of a millet seed to that of a cherry stone.

4. There are cases on record of women who died just before menstruating, in one of whose ovaries a vesicle was observed in a state of great maturity, enlarged and prominent, with its outer coverings much thinned, semi-transparent, and in one point apparently about to burst.

5. In a considerable number of cases of death during menstruation, one ovary presented a cavity recently emptied, or partially filled by a clot, from which a duct-like canal passed through the

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* London Journal of Med., April, 1850.

coats of the ovary. That this cavity contained a Graafian vesicle cannot reasonably be doubted.

6. On examining the ovaries, a number of cicatrices may be observed, some more, some less recent; and in several cases these have been ascertained to correspond exactly with the number of the menstrual periods. According to Mr. Girdwood's researches, this is always the case.

7. These cicatrices, when cut open, exhibit the yellow spots, which result from an hypertrophied condition of the proper membrane of the Graafian vesicle. These *menstrual corpora lutea* have given rise to much controversy as to their difference from, or relation to, the *corpora lutea of pregnancy*, of which I shall have more to say presently.

8. Cases are on record in which (according to Dr. Ritchie) menstruation has taken place without the escape of a vesicle, and others, also, in which there was evidence of the escape of a vesicle previous to menstruation. This latter case has occurred more frequently than the former (and answers to those cases in which conception has preceded menstruation, or occurred during lactation), but both are so rare as scarcely, if at all, to affect the question.

9. This view is further supported by the analogy of other mammalia, as both Bischoff and Raciborski have shown in the case of the bitch; so much so that the former accurate observer lays down the law as equally applicable, that "the ova formed in the ovaries of females of the human species and of mammiferous animals, undergo a periodical maturation quite independent of the influence of the male seminal fluid."*

It appears to me that the great difficulty to the reception of the ovular theory of menstruation is the inadequate number of the Graafian vessels, as seen by the naked eye, and different theories have been broached to explain their multiplication; but these are unnecessary, since the microscope, as I have mentioned, reveals the existence of far more than sufficient both for menstruation and gestation.†

The conclusions which have been so ably put forth by M. Pouchet are as follows: "1. That in all classes of mammalia ova are produced spontaneously in the ovaries. 2. That they are expelled spontaneously at regular intervals, independently of coition. 3. That in the human female they are so expelled at each menstrual period, this period corresponding to the rutting season of animals. 4. That the ova are, and can be, fecundated only after their expulsion from the ovary; the various solid membranes by which they are protected previous to this expulsion opposing a complete obstacle to the access of the spermatic corpuscles, the actual contact of which is indispensable to the impregnation of the ovum. 5. That in all probability the part where fecundation usually takes place, is the cavity of the uterus, or the lower part of the fallopian tube."* With these views Bischoff, Raeiborski, and others agree; but although there is a great body of evidence in support of this view, it may be doubted whether it is as yet sufficient to warrant such positive deductions.

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* Müller's Physiology: Supplement, p. 45.

† See also Dr. Charles G. Ritchie's Contributions to Assist the Study of Ovarian Physiology and Pathology. London, 1865, p. 133.

Professor Müller's opinion, which is more cautiously expressed, is perhaps more strictly in accordance with the present state of our knowledge. He observes that "the number of facts at present collected are insufficient to establish it as a *law*, that an ovum is discharged from the ovary of the human female at *every normally developed period of menstruation.* Yet it must be observed, that although the diseases causing death must, in the majority of instances, disturb the function of the ovaries, and prevent the extrusion of the ovum, yet to each of those inquirers who have been on the watch for such cases, several instances of ruptured follicles in menstruating women have occurred within a short space of time. And the fact that the ovaries of the human female become turgid and vascular at the menstrual periods, as those of animals do at the time of heat, strongly favours the opinion that the generative system of the human female is subject to the almost universal law of the periodical discharge of ova."†

The *final cause* of menstruation is said to be, 1, To get rid of the surplus blood employed during gestation in the nutrition of the fœtus, but which in the unimpregnated state might be injurious; and, 2, To prepare the uterus for impregnation and conception. The first is a mere hypothesis grounded on an assumption, for it is not proved that there is any surplus blood when the female is not pregnant; I need, therefore, say no more about it.

As to the second theory, it is based upon the observation, that conception seldom or never takes place before the period of the first menstruation, or puberty; that it does not occur in those who do not menstruate, or after the cessation of menstruation; and that calculations show that it takes place more rapidly soon after a menstrual period. This latter is a very old observation, and is held by most modern obstetricians. Naegelè, for instance, calculates the duration of pregnancy at nine months and eight days from the last menstrual period, and in normal cases he says he has never been wrong. The popular mode of calculation is pretty much the same.

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* Théorie Positive de la Fécondation.

† Physiology: Supplement, p. 50.

M. Bischoff thus expresses himself: "At certain periods, known as those of 'heat' or 'the rut' in animals, and 'menstruation' in the human female, the ova which have become mature disengage themselves from the ovary, and are extruded. Sexual desire manifests itself in the human female with greater intensity at these periods, and in the females of mammiferous animals at no other time. If the union of the sexes take place, the ovum is fecundated by the direct action of the semen upon it. If no union of the sexes occur, the ovum is nevertheless extruded from the ovary, and enters the fallopian tubes, but there perishes."

I may here remark, 1. That if this view be strictly correct, conception could scarcely occur previous to the appearance of the menses, or without their reappearance; and yet both cases do occur, and the latter not very rarely. 2. That the discharge of the ovum must necessarily be about the termination of menstruation, or it would escape with that excretion. 3. That conception must take place within a few days of that period, or the ovum would escape, and only during that short space, because afterwards there would be no vesicle to be fecundated. How long this period may be it is difficult to say; but it would be difficult to reconcile this view with the cases which occur, of impregnation taking place ten, twelve or twenty days after the cessation of the menstrual period,* which are not uncommon. Jewish females are required to abstain from intercourse for five days before and seven days after menstruation, and yet they are very fruitful; and Hirscher mentions a case of conception, where he ascertained that impregnation occurred twenty-two days after healthy menstruation. If we calculate the period of pregnancy according to Naegelè, or allow a few days more (reckoning from the mid-period, in the popular mode), my own experience, and that of others, would show that more women overrun than anticipate the nine months. I cannot think that the period for conception is so limited as these opinions, if correct, would require; neither am I sure that there is an increase of sexual desire at the menstrual period.

Dr. F. H. Ramsbotham has put forth his views of the final cause of menstruation, which I think it right to lay before the reader. He conceives that the function of menstruation is

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* Oldham: Med. Gaz., July 13th, 1849.

"identical with the nutrition of the young ovum, and that the menstrual discharge indeed is nothing less than the rudiments of the deciduous membrane itself; or rather that it would have become the deciduous membrane, provided conception had occurred:" and he explains the process more fully thus,—"An ovule ripe for impregnation parts from the nest in which it had been elaborated, being conveyed by the grasp of the fallopian fimbriæ. At the same time Nature establishes an action for the purpose of preserving it, provided an opportunity of becoming impregnated by contact with the male semen is afforded it. Should that contact take place, and conception follow, the fluid formed is retained within the uterus, and is gradually converted into the deciduous membrane, which becomes the first medium of communication between the newly animated ovum and the maternal vessels. If, on the contrary, conception do not happen, the ovule perishes, and the fluid secreted for its advantage not being required, is allowed to exude externally, as a superabundant and useless excretion."*

The first difficulty involved by this view is the limitation of the period of impregnation, which hardly corresponds with the latitude allowed, so far as we can infer from the period of delivery. This, Dr. R. thinks, may be explained by the impregnation taking place either in the ovary or fallopian tube, and the additional time required for the descent of the ovum.

In a subsequent communication, Dr. Ramsbotham widens his theory a little, by supposing that the ovum may "part from its previous connexions some days before the menstrual fluid is secreted," and so be liable to impregnation; and, on the other hand, that the ovum may be retained after the escape of the catamenia; and that if within a certain period it be impregnated, the uterus may then take on new action, and form a fresh secretion, which is converted into decidua.

This extension of the period of conception, to a certain extent removes a second objection, viz., that we can hardly suppose impregnation to occur after the commencement of the menstrual secretion, because of the impediment that would be to the ascent of the spermatozoa, and because separation of the sexes is almost universal during these periods, unless we suppose also that the menses are retained in utero after secretion, of which we have no evidence.

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* Med. Times and Gazette, Jan. 17th, 1852, p. 57. Some interesting correspondence upon this subject will be found in the same journal for Jan. 24th, p. 92; Jan. 31st, p. 115; March 20th, p. 229; March 27th, p. 325, of the same year.

I must add, as a third objection, that I cannot think that we have any adequate proof that the menstrual secretions can be converted into the decidua, considering the difference in their elementary constituents. That the same condition of the organ may, under a different stimulus, secrete *either* the one or the other, according to the peculiar stimulus, I can easily understand, but that does not seem to be Dr. Ramsbotham's view.

Lastly, this theory seems hardly consistent with the laws of menstruation, when the fallopian tubes are impervious, or with cases of extra-uterine fœtation in which a deciduous membrane is found.

Having noticed these different theories, I think it will be the wiser plan to put forward no theory of my own. Our knowledge is at present very deficient, but the inquiries recently set on foot may perhaps result in a more perfect acquaintance with these important processes and their various relations.

The disorders of menstruation consist — 1. In deficiency—amenorrhœa; 2. Difficulty—dysmenorrhœa; and 3. Excess—menorrhagia.*

CHAPTER II.

GENERATION.—CONCEPTION.

IMMEDIATELY after the effective intercourse of the male with the female, a series of changes commences, which ultimately issue in the formation of a new being, possessed of individual or independent life. The first step in this process is called Generation, Fecundation, Conception, &c. The period of fecundity in the human female lasts about thirty years, *i.e.*, from the fifteenth to the forty-fifth year, or thereabouts; in other words, it is contemporaneous with menstruation.

From the hidden nature of the process and the stupendous results, the subject has always possessed the deepest interest for physiologists, and at the same time given rise to a multitude of theories, most of them, to say the least, mere hypotheses. Dr. Allen Thompson, in his valuable paper,† thus classifies them: "The greater number of the older theories of generation may be brought under one or other of these divisions—viz., the theory of the *ovists*, of the *spermatists*, or of that of *combination*, *evolution*, or *epigenesis*. According to the first-mentioned of these hypotheses, or that of the ovists, the female parent is held to afford all the materials necessary for the formation of the offspring, the male doing no more than awakening the formative powers possessed by and lying dormant in the female product. This was the theory of Pythagoras, adopted in a modified form by Aristotle; and we shall afterwards see that it resembles most closely the prevailing opinion of more modern times. The terms, however, in which some of the older authors expressed this theory are very vague; as, for example, in the notion that the embryo or new product is formed from the menstrual blood of the female, assisted by a sort of moisture descending from the brain during sexual union.

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* For fuller details concerning these disorders, I beg to refer my readers to my volume on Diseases of Women.

† Cyclopædia of Anatomy and Physiology. Art.—Generation.

"According to the second theory, or that of the spermatists, among the earlier supporters of which Galen may be reckoned, it was supposed that the male semen alone furnished all the vital parts of the new animal, the female organs merely affording the offspring a fit place and suitable materials for its nourishment. Immediately upon the discovery of the seminal animalcules, these minute moving particles were regarded by some as the rudiments of the new animal. They were said to be miniature representations of men, and were styled *homunculi;* one author going so far as to delineate in the seminal animalcule the body, limbs, features, and all the parts of the grown human body. The microscopic animalcules were held by others to be of different sexes, to copulate, and thus to engender male and female offspring: and the celebrated Leeuwenhoek, who was among the first to observe these animalcules, described minutely the manner in which they gained the interior of the egg, and held that after their entrance they were retained by a valvular apparatus.

"The theory of *syngenesis* or combination seems to have been applied principally to the explanation of the reproduction of quadrupeds and man, the existence and nature of the ova of which were involved in doubt. This hypothesis consists in the supposition, that male and female parents both furnish simultaneously some semen or product; that these products, after sexual union, combine with one another in the uterus, and thus give rise to the egg or structure from which the fœtus is formed. In connexion with this theory, we may also mention that of *metamorphosis,* according to which, a formative substance is held to exist, but is allowed to change its form in order to be converted into the new being; as also the notion of Buffon, that organic molecules universally pervade plants and animals, that these are all endowed with productive powers, that a certain number are employed in the construction of the textures of organized bodies, and that in the process of generation, the superabundant quantity of them proceeds to the sexual organs, and there constitutes the rudiments of the offspring."

It would be mere waste of time to enumerate the modifications of these theories, which have been promulgated in profusion from time to time; of which "groundless hypotheses" Drelincourt reckoned two hundred and sixty-two, and in addition to which, as Blumenbach remarks, "nothing is more certain than that Drelincourt's own theory formed the two hundred and sixty-third."

The best plan will be to state briefly such facts as we possess, which bear upon the conditions of generation and the changes produced by it. We have already ascertained that the ovaries contain certain vesicles, and we have reason to believe that these undergo certain changes before and after a successful coitus, and that their contents, or that of one, constitutes the contribution of the female towards the production of a new being. Again, we know that the testes of the male secrete a peculiar fluid called semen, which in the act of intercourse is projected into the vagina, and arrives by a process we cannot as yet explain in the uterus of the female, and is supposed to exert a peculiar influence upon the Graafian vesicles; but the difficulty has been to explain how that influence is communicated or carried to the ovary, or whether impregnation takes place in the ovary, fallopian tubes, or uterus. Various theories have been propounded (that of an *aura seminalis*, for example), but none were consistent with the observations made upon other orders of animals; from which it appeared that contact of the semen with the ova was necessary. This obstacle seemed to be removed by the observations of Dr. Bischoff of Heidelberg, Dr. M. Barry, and Professor Wagner of Berlin, who believed themselves to have detected spermatozoa in the fallopian tubes, especially at their ovarian extremity. It appears doubtful whether spermatozoa have really been detected in the ovary or at the upper extremity of the fallopian tubes, but Bischoff still holds the opinion that impregnation takes place generally in the upper part of the fallopian tubes: Prevost, Dumas, and Barry, that spermatozoa enter bodily into the ovum. The latter view is not supported by recent researches, and Pouchet opposes both that and Bischoff's, maintaining that fecundation takes place only in the lower part of the fallopian tubes or uterus. A very strong argument in favour of ovarian or tubal impregnation is the occurrence of extra-uterine—ovarian or fœtal—gestation. In such cases the spermatozoa must have reached both tube and ovary. What I think clear enough is, that the contact of the spermatozoa with the liberated ovum is necessary to fecundation; and this is confirmed both by the observations of comparative anatomy and by the experiments of Cruikshank, Haighton, and Blundell, who found that if the fallopian tubes were rendered impermeable, impregnation was prevented; but this does not prove where impregnation is effected; whether in the tubes or in the uterus, or, as may be probable, sometimes in one and sometimes in the other. The experiments of Spallanzani and others have proved that a very small quantity of semen is sufficient for fecundation.

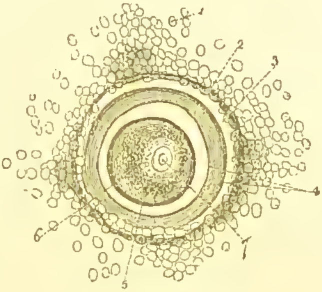
Thus, then, we may enumerate as the conditions of generation, the actual contact of the male semen or its spermatozoa with a healthy Graafian vesicle or an ovule. The immediate effect of this contact or of successful intercourse, is the production of great excitement and vascular turgescence of the uterus, ovaries, and fallopian tubes, which lasts for some time, and during which an alteration takes place in the relations of the different parts. The fimbriated extremity of one of the fallopian tubes is turned towards the ovary of that side, and embraces it closely, over the vesicle which has been, or is to be, impregnated. This delicate operation has been attributed partly to the vascular turgescence, and partly, as in certain animals, to muscular action. How soon it takes place after impregnation is not yet determined; it must occur at each menstrual period, if the ovular theory of menstruation be true.

With regard to the ovum itself, one or more of the vesicles enlarges and becomes vascular, the vessels converging towards the point at which the rupture of its coats is to occur. "The fluid," says Dr. Allen Thompson, in the essay already quoted, "contained in the vesicles which are about to burst, previously transparent and nearly colourless, now becomes more viscid and tenacious, somewhat turbid, and of a reddish colour; and in some animals, it is possible in such ripe vesicles to perceive with the unassisted eye, in a favourable light, a whitish opaque spot on the most prominent part, indicating the layer of granules, or proligerous disc, in the centre of which the ovum is situated. After a certain time, a small opening is formed at the most prominent part of the coverings of the vesicle; the vesicle bursts, and its contents escape through the opening: they are received into the infundibulum, which is now applied firmly against the ovary; and the ovum entering the fallopian tube is conveyed along it, probably by its slow and gradual vermicular contractions, until it at last arrives at the uterus." Recent observations would lead us to attribute some influence in this transmission, to the ciliary motions of the villi of the mucous membrane lining the tube.

It is scarcely possible to obtain an opportunity of examining the minute changes which take place in the Graafian vesicle in the human female; we must therefore avail ourselves of the information afforded by comparative physiology, and the more readily, as the process does not differ essentially. The following description is extracted from Dr. M. Barry's beautiful paper:*—"Among the changes occurring in the ovum (of the rabbit) before it leaves the ovary, are the following: viz., the *germinal spot* previously at the inner surface, passes to the centre of the *germinal vesicle*; the *germinal vesicle*, previously at the surface, passes to the centre of the *yelk*; and the membrane, investing the yelk, previously extremely thin, suddenly thickens." The *tunica granulosa* and *retinacula* are discharged with the ovum.

Among the changes usually taking place in the ovum during its passage through the fallopian tube, are the following: viz., 1. An outer membrane, the *chorion*, becomes visible. 2. The membrane originally investing the yelk, which had suddenly thickened, disappears by liquefaction; so that the yelk is now immediately surrounded by the thick transparent membrane (*zona pellucida*) of the ovarian ovum. 3. In the centre of the yelk there arise several very large and exceedingly transparent vesicles. These disappear, and are succeeded by a smaller and more numerous set. Several sets thus successively come into view, the vesicles of each succeeding set being more numerous and smaller than the last, until a mulberry-like structure has been produced, which occupies the centre of the ovum. Each of these vesicles contains a colourless and pellucid nucleus, and each nucleus presents a nucleolus.

Fig. 39.



(*From Barry.*)

1. Tunica granulosa.
2. Chorion.
3. Zona pellucida.
4. Thick transparent membrane.
5. Yelk ball.
6. Germinal vesicle.
7. Germinal spot.

"In the uterus, a layer of vesicles, of the same kind as those of the last and smallest here mentioned, makes its appearance on the whole of the inner surface of the membrane which now invests the yelk. The mulberry-like structure then passes from the centre of the yelk to a certain part of that layer (the vesicles of the latter coalescing with those of the former, where the two sets are in contact, to form a membrane, the future amnion), and the interior of the mulberry-like structure is now seen to be occupied by a large vesicle, containing a fluid and dark granules. In the centre of the fluid of this vesicle is a spherical body, composed of a substance having a finely granulous appearance, and containing a cavity filled with a colourless and pellucid fluid. This hollow and spherical body seems to be the true germ. The vesicle containing it disappears, and in its place is seen an elliptical depression, filled with a pellucid fluid. In the centre of this depression is the germ, still presenting the appearance of a hollow sphere."

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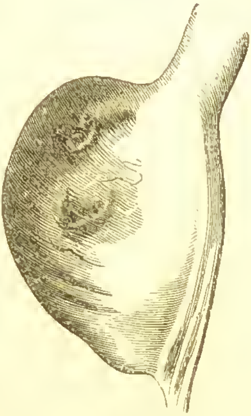
* Philosophical Trans., 1839, part ii. p. 350.

It is unnecessary to apologize for this minute account of the changes in the vesicle; the interest of the question, and the light thrown upon it by the able and careful researches of the distinguished physiologist from whom I have quoted, are more than sufficient reason for laying the results before my readers.

Let us now retrace our steps a little: during the increase of the vesicle in the ovary, "the inner coat becomes intensely vascular, and on its external surface, a soft gelatinous substance, of a yellowish-red colour, consisting apparently in part of blood and in part of lymph, is poured out between the two coats of the vesicle, in considerable quantity all around, except at the point where it is pressed toward the external surface of the ovary." Such is Dr. Montgomery's description of the formation of the *corpus luteum,* which he conceives aids in the expulsion of the ovum, after having served "as a sort of little temporary uterus" to the contained germ, "lined with a serous membrane, covered externally by another, and having interposed between them the fleshy or granular structure of the corpus luteum, through which bloodvessels ramify, and exhale through the lining membrane a serous fluid for the support of the early ovum, which as yet lives only by imbibition." Professor von Baer thought that the corpus luteum was the lining membrane of the vesicle in a state of hypertrophy, and Dr. R. Lee believes it to be a deposit external to the lining. Drs. Paterson and Renard agree with Dr. Montgomery; but Knox, Pouchet, Müller, and Dalton, regard it as a hypertrophy of the outer membrane, and formed after the escape of the ovum.

Shortly after the evolution of the ovum, the size of the ovary is found to be increased, especially at a certain part which is prominent, and about the size of a nut. At an early period after conception, this small tumour is of a bluish-red or purple colour, owing probably to the effusion of blood attendant on the rupture of its coats, and having numerous vessels filled with florid blood ramifying on its surface. In some part of this coloured surface of the tumour, a cicatrix, depression, or aperture may be discovered, being the point at which the ovum escaped from the ovary into the fallopian tube.

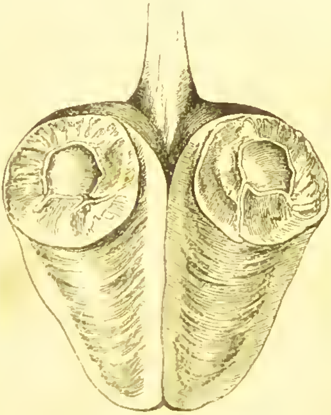
Fig. 40.



(*From Dr. Montgomery.*)

These external appearances, however, are inadequate to prove the presence of a true corpus luteum; they require confirmation by the results of an internal examination. "Upon slitting open the ovarium at this part," says Dr. W. Hunter, "the corpus luteum appears a round body, of a very distinct nature from the rest of the ovarium. Sometimes it is oblong or oval, but more generally round. Its centre is white, with some degree of transparency, the rest of its substance has a yellowish cast, is very vascular, tender, and friable, like glandular flesh. Its larger vessels cling round its circumference, and then send their smaller branches inwards through its substance;" which substance, according to Dr. Allen Thompson, "has a lobular structure, the lobules radiating in a somewhat irregular manner from the centre to the circumference. The central part of the corpus luteum frequently remains hollow for some time after its production, opening exteriorly by a narrow passage from the part where the rupture of the vesicle originally took place; at other times this passage is closed more early, and there remains nothing but an indication of its place, in a depression in the centre of the most projecting part of the corpus

Fig. 41.



Corpus luteum.

(*From Dr. Montgomery.*)

luteum. The lobules of the corpus luteum, examined with the microscope, exhibit merely a granular structure, and are not formed of acini, as some have described them, so that there is no reason to consider them bodies of a glandular nature."

The following measurements of the ovaries and corpus luteum, at the third month of pregnancy, are given by Dr. Montgomery.

The unimpregnated ovary.		Ovary containing a corpus luteum.	
Length . .	1 inch 5 lines.	Length . .	1 inch 3 lines.
Breadth . .	„ 7½ „	Breadth . .	„ 9 „
Thickness .	„ 5½ „	Thickness .	„ 7½ „

Dr. Knox has drawn up the following table of measurements of the corpus luteum at different periods of pregnancy:

No. of days after Impregnation.	Name of Reporter.	Long diameter, in lines.	Short diameter, in lines.	Thickness of the glandular part.	Diameter of the Central Cavity.
5	Horne	9	6	1½	
8	Ditto	9	6	1½	
48	Lee	9	7½	1	6
62	Ditto	6	3½	1	3
62	Clarke	9½	8	3	
70	Montgomery	7	6		
93	Ditto	7½	6½	2½	3
108	Keever	9	7	2	4½ and 2½
108	Knox	7	6		
155	W. Hunter	8½	7	–	4½ and 1½
186	Rœderer	6	5	3	2
186	Montgomery	6	5	3	2
186	Horne	7½	4½	1	4
201	Lee	6	4½	1	3
280	Rœderer	7	4		
280	Montgomery	6	5		
280	W. Hunter	6	5		
285	Knox	4	2½	1½	1½

For a short time after the escape of the ovum, the corpus luteum is said to increase in size, then to remain stationary, and afterwards to diminish slowly. After the third or fourth month the central cavity contracts, and its sides coming in contact, give it the appearance of an irregular white line, somewhat radiated. After delivery, the corpus luteum shrinks, absorption takes place, and it disappears, though at what time is not quite certain. Dr. Montgomery has observed it five months after delivery; but Dr. Paterson's investigations would lead to the conclusion that it seldom remains so long.

Dr. Dalton gives it as the result of his observation, that the corpora lutea of menstruation and pregnancy follow the same course of development in the first period. "Together with the rupture of the vesicle, the same effusion of blood takes place in either case, followed by a gradual absorption of the colouring matter of the clot, and hypertrophy and folding up of the membrane of the vesicle. When, however, the ovum becomes impregnated, and continues its growth in the uterus, the corpus luteum, instead of reaching its maximum of development at the end of three weeks, and afterwards undergoing a rapid process of atrophy, *continues to develop itself* for a considerable period, and does not, in fact, become very decidedly retrograde until after the termination of pregnancy." "The difference in the progress of the corpus luteum, however, relates not only to its size, but also to its general characters and aspect. The external wall becomes much thicker in proportion to the central coagulum, and at the same time acquires a firmer and more highly organized structure. Moreover, the colour both of the convoluted wall and of the central coagulum constitutes an important means of distinction. It has been shown that the corpus luteum of menstruation retains the bright colour of its walls till the whole body has become much reduced in size, and that the coagulum in its interior also remains more or less stained with red till a late period. On the other hand, if pregnancy occur, the circumstances are reversed. The colour, both of the wall and the coagulum, fades rapidly after the first two months, while the substance of the yellow body continues to increase; consequently, during the greater part of gestation, the corpus luteum of pregnancy will be distinguished from that of menstruation by the dull hue of its convoluted wall, and by the absence of colour in the central coagulum."*

The number of corpora lutea corresponds exactly to the number of children; as Dr. W. Hunter remarked, "Where there is only one child, there is only one corpus luteum, and two in the case of twins." Meckel examined two hundred females of the class mammalia, and found this correspondence exact.

Two very important questions here demand notice: 1. Are corpora lutea the result of pregnancy only, and does their presence indicate previous impregnation? And 2. If not the result solely of pregnancy, can the corpora lutea of pregnancy be distinguished accurately from those of menstruation?

Various opposite opinions have been held upon the first of these points.

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* Prize Essay, p. 71.

Haller, Meckel, Haighton, Velpeau, Montgomery, Müller, &c., believe that corpora lutea are the result of impregnation only; others, as Cruikshank, Gross, Seymour, Gooch, Blundell, Renaud, &c., believe that whilst, as a general rule, corpora lutea result from conception, yet that they are occasionally met with in virgins, the one being true, the other false corpora lutea.

A third class of writers, who believe that ova are discharged during menstruation, and have observed the peculiar change in the part of the ovary from which they have escaped, regard them as equally true corpora lutea, and deny that there is any essential difference between the corpora lutea of menstruation and pregnancy. This opinion was put forward by Sir E. Home, and is adopted by Dewees, Bischoff, Napier, Pouchet, Raciborski, Chereau, &c. M. Pouchet states as his opinion, that "since the fact of spontaneous ovulation has been demonstrated, it must now be superfluous to point out the futility of the distinction between true and false corpora lutea; they are all produced by the same processes; they have all discharged ova before presenting themselves under the aspect which they assume after that occurrence. And whether the ovule which they have expelled does or does not become fecundated, whether or not it undergoes the transformation into an embryo, all have nevertheless the same form and the same structure."*

Now, the cases and dissections I have heretofore quoted, even if they be considered inadequate to warrant the deduction of a general rule, do at least prove both that an ovum is frequently, if not always, discharged at a menstrual period, quite independent of sexual congress, and that certain changes take place in the membrane from which it escaped, which are in some degree analogous to the corpus luteum; that these changes constitute what may be called the *corpus luteum of menstruation.* So far I must agree with the two latter classes of authorities; but, on the other hand, we find the corpus luteum of pregnancy to differ from this in many particulars, and so much so, as to justify the opinion of the first class of authorities—that the true corpus luteum (taking that found in the ovaries of women during gestation as the standard) was the result and evidence of conception, and of nothing else. This is the conclusion to which Dr. Dalton has arrived, by an extensive and minute investigation in the human subject and in animals, and I think the evidence we possess quite sufficient to satisfy any impartial inquirer.

It becomes, then, of great importance to state explicitly the points of difference between the two classes of corpora lutea, and the more so, as certain medico-legal inquiries are considerably influenced by their presence or absence. Dr. Dalton thus states the result of his investigations: — "1. The corpus luteum of pregnancy arrives more slowly at its maximum of development, and afterwards remains for a long time as a very noticeable tumour, instead of undergoing a process of rapid atrophy. 2. It retains a globular or only slightly flattened form, and gives to the touch a sense of considerable resistance and solidity. 3. Internally it has an appearance of advanced organization, which is wanting in the corpus luteum of menstruation. 4. Its convoluted wall, particularly, attains a greater development, this portion measuring sometimes so much as three-sixteenths to one-fourth of an inch in thickness; while in the corpus luteum of menstruation it never exceeds one-eighth, and is almost always less than that. This difference in the thickness of the convoluted wall is one of the most important points of distinction. It will be much more striking when viewed *relatively to the size of the coagulum.* 5. The colour is not by any means so decided a yellow, but a more dusky and indefinite hue. 6. If the period of pregnancy be at all advanced, it is not found, like the corpus luteum of menstruation, in company with unruptured vesicles in active process of development."*

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* Théorie Positive de l'Ovulation Spontanée, &c., p. 185.

Thus, if due care be taken, the corpus luteum of pregnancy can be distinguished from the changes which follow ordinary ovulation, by whatever name they are called, and therefore the presence of such a corpus luteum is as sure an evidence of pregnancy as it has ever been considered.

CHAPTER III.

UTERO-GESTATION.†

BEFORE proceeding to investigate the farther development of the ovum, let us examine the *changes which impregnation occasions* IN THE UTERUS, and which prepare it for the reception and nutrition of the fœtus.

It has already been stated, that conception is accompanied or immediately followed by congestion of the uterus; its *vessels* are filled with blood, and enlarge gradually, until they become of great size. Many which did not carry red blood before, and therefore were invisible, are now evident, and the whole form an intricate net-work on the surface and in the substance of the organ. Not only are the *arteries* (fig. 42) distended, but to meet this increased labour imposed upon them, their coats are actually increased in thickness, so much so as to preclude their return to their former condition after the object of their temporary enlargement is fulfilled. This explains why we always find them more or less enlarged and tortuous in women who have borne children.

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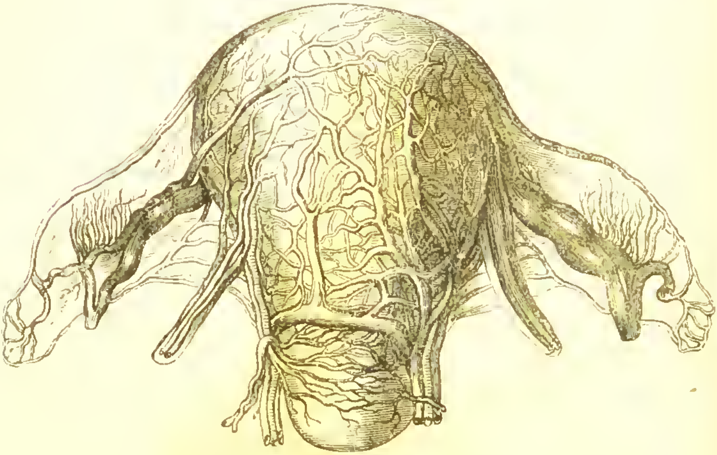
* Prize Essay, p. 73.

† For a minute account of the changes which take place, I would refer the reader to Dr. Farre's admirable article in Todd's Cyclopædia, parts 49 and 50.

Fig. 42.



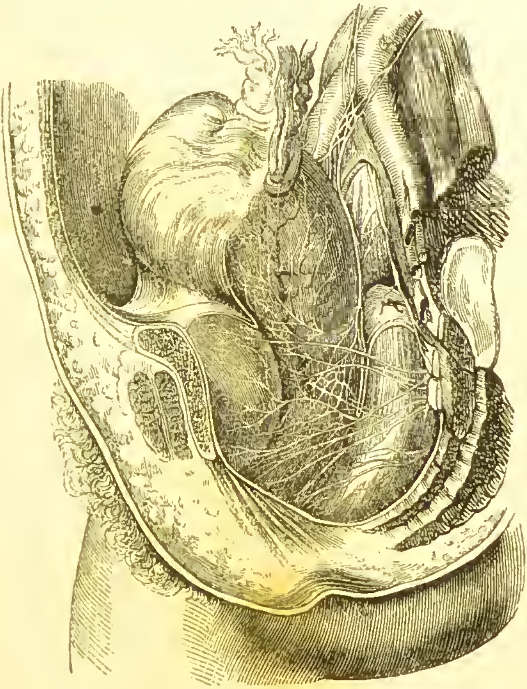
(*From Dr. R. Lee.*)

The coats of the veins are much thinner, and admit of still greater distension; this is so marked in that part of the uterus to which the placenta is attached, that they have received the name of *uterine sinuses.*

The *lymphatics* undergo a proportionate development, and in the latter months of pregnancy may easily be traced. Mr. Cruikshank, I believe, has the credit of first demonstrating them.

The *nerves* of the uterus (fig. 43), which are very small in its unimpregnated state, increase in size, until at the full term they form large cords, which send off numerous branches to accompany the uterine vessels, and which, anastomosing freely with each other, exhibit an appearance of net-work, similar to that observed in the vessels. It is now ascertained that the real increase is not in the nerve-substance, but in the nerve termina, and so enlarged they do not recover their pristine size after delivery.

Fig. 43.



(*From Dr. R. Lee.*)

We are much indebted to the labours of Hunter, Tiedemann, and Dr. Lee, for the additions they have made to our knowledge of the nerves of the uterus.

Great as these changes are, they are equalled, if not surpassed, by those which take place in the *proper tissue* of the uterus. In proportion as space is required for the fœtus, on account of its growth, the fibres are loosened, and separated from each other, leaving between them large interspaces, which afford space for, and are occupied by, the enlarging bloodvessels and nerves. The amount of distensibility is very great, and fully equal to the accommodation of the fœtus, during the term of intra-uterine life. Nor is this distension accompanied by much thinning of the parietes: according to Meckel, they increase in thickness during the first three months, and afterwards diminish to the end of gestation; but even then they are from one to two-thirds of an inch thick, and even more about the insertion of the placenta. To explain this, it has been assumed that new matter is superadded during gestation, and removed after delivery; and this opinion is confirmed by the difference in weight between a virgin uterus and one at the full term, emptied of its contents; the former weighing one ounce, the latter about twenty-four. Even when deprived of its extra quantity of blood by firm contraction after delivery, it is many times larger than before conception.

Mr. Rainey's researches seem to show that this is in the first instance simply from the increase in the volume of the fusiform nucleated fibres; this being, he thinks, "quite sufficient to account for the amount of augmentation of the entire organ, without supposing that organic muscular fibres, not present in the inactive state of the uterus, are absolutely formed during the various stages of its enlargement." "The unimpregnated uterus being, according to this notion, little more than an assemblage of embryonic nucleated fibres, wholly inactive until after the reception of the ovum, when, being roused by an appropriate stimulus, they are called into active operation, and become developed simultaneously and proportionally to the development of the fœtus contained within it; so that, when one has arrived at a state requiring to be expelled, the other has acquired the utmost degree of fitness necessary to effect its expulsion. Now, after the expulsion of the fœtus, since according to the laws of development, it is as impossible that these fibres of the impregnated uterus can return again to their primitive or embryonic condition, as that a full-formed fœtus could relapse into the state of an ovum, they must necessarily become absorbed, and therefore a new set of embryonic fibres would require to be formed for the expulsion of the next ovum: so that each fœtus will have, according to this conclusion, its own peculiar expulsory fibres."* The process of absorption has been shown by Professor Retzius of Stockholm, Dr. Heschl,† and others, to be marked by a species of fatty degeneration,‡ which Mr. Barlow and others regard as a step towards organic death.

The increase in the *size* of the womb is said to commence at the fundus, immediately after the descent of the ovum, and as this is developed the body enlarges; last of all, and not before the fifth month, the cervix. But an ingenious American writer, Dr. Read,* has proposed the following substitute for this view, and has adduced some weighty arguments in its favour:—"The attachment of the placenta to any portion of the uterus causes a development at that place, which proceeds *pari passu*, till the limits of growth in the placenta having been reached, the enlargement is continued and kept up by the pressure constantly exerted on the uterine walls by the growing contents till the time of parturition."

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* Philosophical Trans., 1850, part ii. p. 519.

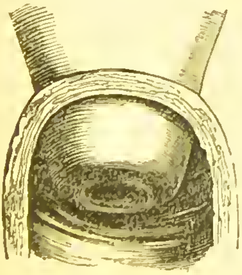
† Researches on the Conduct of the Human Uterus after Delivery, translated by Dr. R. M'Donnell.

‡ Edin. Monthly Journal, Aug. 1852, p. 127, note.

During the first four months the entire organ is contained in the cavity of the pelvis; soon after which time the fundus may be felt, in thin females, above the symphysis pubis; about the fifth month it reaches midway between the pubes and umbilicus, and gives a roundness and fulness to the lower part of the abdomen; at the end of the sixth month it is as high as the umbilicus, which it protrudes; during the seventh month, it ascends midway between the umbilicus and the ensiform cartilage; at the end of the eighth month it reaches the ensiform cartilage and fills the abdomen, having the intestines above and behind it.

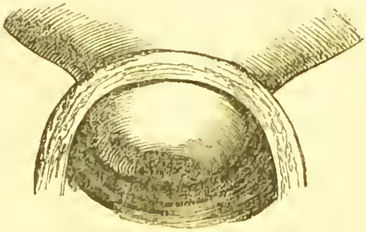
During the ninth month, although it somewhat increases in size, yet, from the yielding of the abdominal parietes, it does not ascend, but on the contrary is somewhat lower than previously. Its capacity is immensely increased: according to the calculations of Levret, its superficies may be estimated at 339 inches, and its cavity will contain 408 inches; its length being from 12 to 14 inches; its breadth from 9 to 10, and its depth, antero-posteriorly, from 8 to 9 inches.

Fig. 44.



Cervix uteri at three months.

Fig. 45.



Cervix uteri at six months.

A considerable change takes place in the cervix uteri; it becomes somewhat swollen, but soft, elastic, and cushion-like; the os uteri loses in some degree its defined form, and is dilatable; the canal through the cervix, during the early months, is closed by the glutinous secretion of the follicles, and these glands are themselves enlarged, so as occasionally to be felt rolling under the finger.

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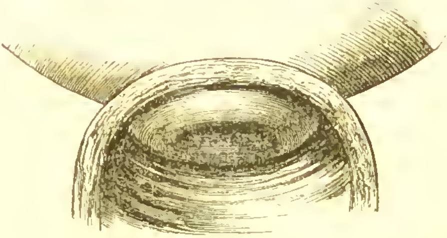
* American Journal of Med. Science, April, 1858.

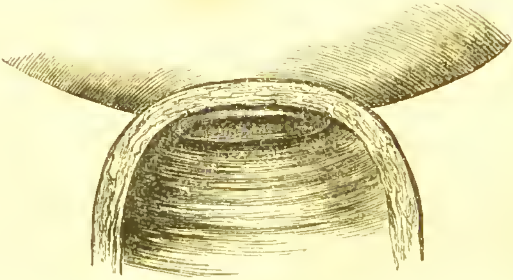
During the first three months, the os uteri is lower than usual in the pelvis, owing to the increased weight of the uterus, and directed a little more forwards; as the uterus rises above the brim of the pelvis, it is directed backwards, and after the fifth month, the cervix is said to be drawn out by the expanding uterus, and shortened. At the sixth month it is said to lose one-fourth of its length (fig. 45); at the seventh it is only half its original length; at the eighth it loses another quarter (fig. 46); and at the ninth the neck is obliterated (fig. 47); so that upon making an examination, we find the vagina closed superiorly by the

Fig. 46.



Cervix uteri at eight months.

Fig. 47.



Cervix uteri at nine months.

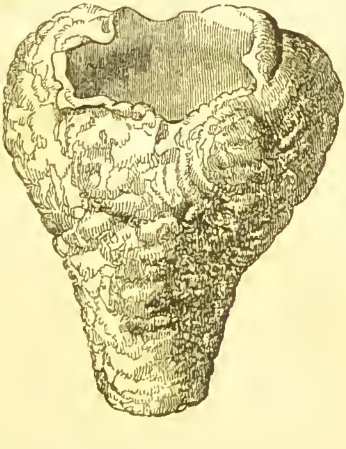
(*All from Montgomery.*)

rounded lower end of the uterus, but no protruding cervix. It would appear, however, that this shortening of the cervix is more apparent than real. Examined by the finger, it certainly protrudes less into the vagina, and its length is really somewhat less; but this, according to the researches of Stolz, Cazeaux,* and Matthews Duncan, is not by distension of its cavity, but by approximation of its two extremities. The latter author† has given sectional outlines of the cervix uteri at different periods, made from dissection, and which appear to justify his conclusions. At the same time he states that the capacity of the canal becomes greater as pregnancy advances by an increase of breadth; that the length of the vaginal projection of the cervix diminishes as the uterus rises, as represented in the plates, and that the substance of the cervix becomes more soft and bulky. In these views Dr. Farre seems to coincide.

The *figure* of the uterus at the full term is oviform (fig. 42), the larger end being uppermost, and rounder in proportion than the lower end. Some variations in shape are observed from the pressure of neighbouring parts, the position of the patient or of the fœtus. Occasionally the uterus stretches unequally, so as to constitute true obliquity, one side being more developed than the other. Such cases are not common, nor do we know much of their effect upon labour.

The axis of the uterus at the end of gestation is commonly more perpendicular than that of the brim of the pelvis; but this want of agreement is rectified at the time of labour by the uterine contractions which tilt the fundus forwards.

Fig. 48.



The *lining membrane* of the uterus participates in the general congestion of the uterus at the time of conception. It becomes turgid with blood; its villi, according to Von Baer, elongate, and over and between them is spread a thin layer of pulpy semi-fluid matter, secreted by the mucous membrane: this is the *decidua* (fig. 48.) It was noticed by Burton, but described particularly by W. Hunter, and called after him the decidua of Hunter. The pulpy matter, after a short time, acquires consistence, and in its appearance and connexion with the subjacent membrane resembles the coagulable lymph thrown off by mucous membranes in a state of disease. It lines the entire cavity of the uterus, closes it inferiorly, and, according to John Hunter and Breschet, sends off a short process into the fallopian tube, through which, they conceive, the ovum descends. Dr. Sharpey, of London, whose microscopical researches are so well known, on investigating the membrana decidua of a bitch, came to the conclusion that it was not a secretion from the lining membrane of the uterus, but that membrane itself altered and modified.* It appears that W. Hunter regarded the decidua as the mucous membrane modified, and this view has also been put forth by Bischoff. Having had the opportunity of examining the uterus of a woman supposed to have been impregnated about three weeks before death, he was enabled to demonstrate quite satisfactorily that the membrana decidua in the human female, as in the bitch, is merely the ordinary mucous membrane of the uterus considerably developed, and that it consists essentially of enlarged uterine follicles and their bloodvessels, together with an unusually large quantity of secretion which these follicles have poured out. The internal surface of the uterus presented an appearance quite different from its ordinary one, being finely villous; and this was especially evident on placing it in water, or examining perpendicular sections of it. The surface itself, when looked upon from above, appeared as if perforated by a number of small apertures, or covered with numerous white points, and these, when examined by the microscope, were found to be openings of cylindrical glandules. These glandules or follicles were from 1½ to 2 Paris lines in length, were held together by a transparent material, and terminated each by a blind extremity which rested on the fibrous tissue of the uterus. They ran a somewhat wavy course, but never branched or anastomosed. Previous to impregnation it seems to be exceedingly difficult to discover these glands in the mucous membrane of the uterus. Probably they then exist in a very undeveloped state, but immediately on the occurrence of conception increase rapidly, and exude an abundant secretion. Of these glands and their secretions (together with bloodvessels) the membrana decidua and, later on, the placenta, essentially consist. The statement that a membrana decidua exists in the fallopian tube as well as in the uterus, in cases of fallopian impregnation, Bischoff combats by observing that so far as has yet been seen, the lining membrane of the fallopian tube contains no glands by which the formation of a structure corresponding to an ordinary membrana decidua could be effected.

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* Midwifery, p. 108, Amer. Trans.

† Edin. Med. Journ., March, 1859.

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* Müller's Physiology, by Baly, part iv. p. 1578.

A similar view to the above, with regard to the membrana decidua, was advocated also by M. Coste* some years ago, afterwards by M. Cazeaux, and recently repeated before the Académie des Sciences, Paris; and it is held, with some modifications, by those who, with Cruveilhier, Ferguson,† and Tyler Smith, believe that, after delivery, the muscular structure of the uterus is denuded of mucous membrane. It has always appeared to me that this point is far from being proved, and I see, by Dr. J. Matthews Duncan's paper,‡ that his investigations have led him to the conclusion that the mucous membrane is not thrown off, except at the part to which the placenta is attached.

The decidua is rough externally at an early period, and smooth internally; and so far resembles serous membranes, that it is a shut sac, and contains a small quantity of fluid. Its colour is reddish or whitish grey. Its thickness varies in different places; it is thicker near the placenta, and thinner near the cervix uteri;

Fig. 49.

(*From Montgomery.*)

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* Archives Gén. d'Anatomie et de Physiologie, Sept. 1846. London Med. Gaz., Nov. 1850.

† On Puerperal Fever. p. 76 *et seq.*

‡ British and Foreign Med.-Chir. Review, Oct. 1853, p. 506.

it also becomes thinner after the third month, in proportion as pregnancy advances. It adheres but loosely to the mucous membrane at an early period, but firmly during the latter months, so much so that Von Baer states that it cannot be separated without bringing away the lining membrane also; this, however, is not always the case. The medium of its connexion with the uterus is chiefly the small vessels which are supplied to it by that organ, and which are arranged in loops round its villi; they are very numerous near the placenta, but more scanty at the cervix.

A very important observation on the structure of the *decidua vera* has been made by Dr. Montgomery, in his valuable work, On the Signs of Pregnancy. "Repeated examinations," he remarks, "have shown me that there are on the external surface of the decidua vera (fig. 49) a great number of small cup-like elevations, having the appearance of little bags, the bottoms of which are attached to, or imbedded in, its substance; they then expand or belly out a little, and again grow smaller towards their outer or uterine end, which in by far the greater number of them is an open mouth when separated from the uterus; how it may be while they are adherent I cannot at present say. Some of them, which I have found more deeply imbedded in the decidua, were completely closed sacs. Their form is circular, or nearly so; they vary in diameter, from the twelfth to the sixth of an inch, and project about the twelfth of an inch from the surface of the decidua." In a note Dr. Montgomery suggests that these "decidual cotyledons" serve "as reservoirs for nutrient fluids separated from the maternal blood, to be thence absorbed, for the support and development of the ovum."

Those who hold the membrana decidua to be a distinct secretion, suppose that when the ovum arrives at the uterine extremity of the fallopian tube, it must either push the membrana decidua before it, or pierce it, in order to enter the cavity of the uterus. Opinions have been much divided as to which of these two operations takes place: Dr. W. Hunter, Dr. R. Lee, and M. Breschet say that the ovum passes into the sac of the decidua; but Lobstein, Burdach, Velpeau, and others, conceive that the sac remains entire, but that the ovum passes behind it to the situation where it fixes itself, and that its free surface (that part, I mean, which is not in contact with the uterus), is covered by the displaced decidua, to which the name of *decidua reflexa* has been given, to distinguish it from the *decidua vera*, and which was first observed by Dr. W. Hunter. As the ovum expands, so does the decidua reflexa, until at the end of gestation its inner surface is in contact with the inner surface of the decidua vera, just like (if

I may be pardoned a very homely simile) the layers of a double night-cap when put on the head. That space of the uterine parietes from which the decidua was detached by the ovum, increases with the enlargement of the uterus, and is occupied subsequently by the placenta; but between this organ and the uterus a new layer of membrane—the *decidua serotina*—is deposited, resembling the decidua vera, to which it is united at the circumference of the placenta.

A third view is held by those who, like Dr. Sharpey, MM. Bischoff and Coste, regard the membrana decidua as nothing but the hypertrophied mucous membrane of the uterus. They consider that the fallopian tubes open freely into the uterine cavity, and that the ovum, on entering the uterus, becomes buried in the mucous membrane by which it is covered. As the ovum increases, the hypertrophied membrane is distended, and forms what is termed the decidua reflexa. As far as I understand, they seem to say that the ovum divides the mucous membrane into two layers—an outer and an inner—answering to the decidua reflexa and the placenta decidua, whilst the remainder answers to the decidua vera.

The decidua reflexa becomes thinner as pregnancy advances, and is ultimately expelled, more or less entire, with the fœtal membranes, whilst the decidua vera may remain for some time, and be then discharged in shreds with the lochia.

We know that the decidua exists before the descent of the ovum, and is therefore independent of it; and it is stated by most authorities, that in cases of double uterus, both contain decidua, and in extra-uterine fœtation the uterus is lined by decidua. There are, however, exceptions to the latter; for in the cases published by Dr. R. Lee* the decidua surrounded the ovum in the tube, and was not present in the uterus.

Abnormal deviations.—The decidua occasionally exhibits the effects of inflammation; it may be hypertrophied or increased in thickness by layers of adventitious membrane, and pus has been found on its surface. In its substance calcareous depositions and spiculæ of bone may sometimes be detected. It may adhere firmly to the lining membrane of the uterus, and persisting after delivery, may constitute the nucleus of a mole, &c.

We have seen that, on leaving the ovary, the ovum is received into the fallopian tube; that its further transmission is effected by muscular motion and the ciliary movements of the villi of the mucous membrane; and that there is reason to believe (judging from the ovum of the rabbit) that in its passage through the tube, an additional covering is developed. It is difficult to determine the period (even if it be regular) at which the ovum arrives in the uterus. One thing appears certain; that several days elapse from the moment of impregnation. One of the earliest ova on record is that described by M. Velpeau (fig. 50, natural size; fig. 51, opened and magnified), which could not have been more

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* Med. Gazette, June 5th, 1849.

Fig. 50.

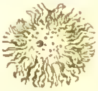
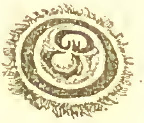


Fig. 51.



(*From Velpeau.*)

than fourteen days old, unless the midwife who gave it to him, and who was herself the subject of the miscarriage, deceived him; and she appears to have had no reason for so doing.*

When the ovum arrives at the uterus, it consists of two membranes, the *chorion* and *amnion;* in the interspace between which is contained the *vesicula alba* or *umbilicalis,* and a *gelatinous substance*—the *tunica media* of Bischoff. Internal to the amnion, we find the *liquor amnii,* and the *embryo.* Each of these parts we shall now examine in detail.

The CHORION is the outer envelope proper to the ovum, and corresponds to the membrane lining the egg in oviparous animals. It is found covering the ovum at the earliest period at which this has been seen in the uterus, surrounding it loosely, and forming a shut sac. It is smooth on its inner surface, but externally it is covered over with short cylindrical villi. As the ovum advances in age, these villi diminish in number, assume a vesicular appearance, and terminate in delicate rounded extremities. The interspaces are larger and more smooth. About the beginning of the second month the villi divide into branches, which arise from short thin stems, and terminate either in thin filiform or vesicular enlargements. The process of obliteration thus commenced, continues until no villi remain, except at that part of the chorion which is in contact with the uterus; the other part presenting the appearance of a thin, colourless transparent membrane.

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* Dr. Allen Thompson has given an excellent notice of early ova, observed by himself and others, in the Edin. Med. and Surg. Journal, vol. lii. p. 119, to which I beg to refer the reader.

The umbilical cord is inserted into some part of the inner surface of the chorion, and the part of the outer surface which corresponds to this insertion is always that which comes in contact with the uterine parietes, and upon which the placenta is formed.

The chorion may be divided into two laminæ, especially where it covers the placenta; the outer is called the *exochorion*, the inner the *endochorion*, by Burdach, who believed the latter to be the vascular layer of the allantois. From the endochorion, according to Bischoff, are derived the vessels which run to the villi. The chorion itself appears to be destitute of vessels, unless, as Dr. W. Hunter suggested, we regard as such the white filaments observed near the edge of the placenta. The intimate structure of the membrane is cellular, and in many places bears a strong resemblance to that of vegetables, each cell containing a distinct nucleus; the villi participate in the same texture, but their cells are filled with a granular matter.

The strength of the membrane is greatest in early ova; at the termination of pregnancy it is considerably weaker than the amnion: at an early period it is equally strong in all parts, but afterwards it is stronger near the placenta. It is covered externally by the decidua reflexa, and internally it is separated from the amnion by a layer of gelatinous matter, which is afterwards condensed into a thin membrane, called *tunica media* by Bischoff, who first described it.

Abnormal deviations.—Inflammation may attack the membrane, giving rise to vascularity, opacity, thickening,* or the effusion of fluid between it and the amnion. Occasionally false membranes are deposited upon it, and the villi may be the seat of hydatids. Dr. Montgomery had a preparation in his museum, in which the cord is inserted into the part of the chorion covered by the decidua reflexa, instead of into that attached to the uterus. The fœtus, of course, perished for want of nourishment. Hæmorrhage sometimes occurs into the space between the chorion and amnion.

I have already mentioned that during the first months of gestation, an albuminous, or gelatinous mass of varying consistency is found between the chorion and amnion. It is often mixed with flocculi, or threads, and occasionally presents a reticulated appearance. "When put into spirits," Wagner observes, "this mass assumes the appearance of the cellular tissue that is found between the muscles, and seems, in fact, to bear the same relation to the amnion and chorion as the intermuscular cellular membrane does to the fasciculi between which it lies." The space it occupies is, in early ova, considerable, but it gradually diminishes as the two membranes approximate, and in proportion the interposed matter is condensed into an extremely delicate membrane, like the arachnoid, termed by Bischoff and Wagner the *tunica media*. By Velpeau it is called the "*corps réticulare*," and he considers it to be the allantois; but this opinion is rejected by other physiologists.

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* Dr. Montgomery, Dub. Hosp. Gaz., March 15, 1857.

The VESICULA ALBA, or *umbilical vesicle* (fig. 54), is also contained in the interspace between the amnion and chorion. According to modern investigations, it is constantly present as a normal formation in the earlier months of gestation, and is connected with the intestinal canal of the fœtus. It is, in fact, the vitellus, surrounded by the blastoderma, upon which the embryo is first formed, and it bears a perfect analogy to the yelk of the egg, except that it is not ultimately enclosed within the abdomen of the fœtus. In very early ova, it is large in proportion, of a rounded or oval form, and lying upon the intestine, with which it communicates. In a short time, however, the inner end becomes narrow, and forms a pervious canal, or duct, through which its contents may be transmitted. M. Velpeau found it pervious in almost every ovum of six weeks old that he examined; and he states that he not only saw vitellary matter in the intestine, but that he could push the fluid from the vesicle through the duct into the intestine. The length of the duct varies in different ova, and its calibre diminishes as gestation advances, until, in the second month, it is impervious and thread-like, but may still be traced to the loop of intestine contained in the sheath of the umbilical cord. The vesicle contains a yellowish-white or yelk-coloured fluid, in which numerous globules are suspended. Its parietes consist of two laminæ, an external vascular, and an internal mucous layer. It possesses two vessels, the omphalo-mesenteric artery and vein, which ramify upon its surface and on the duct. As gestation advances, the vesicle is emptied, shrinks, and remains flat and collapsed to the termination of pregnancy.

Its *use* is evidently to contain nutriment for the fœtus, before the development of the placenta.

The AMNION (fig. 55).—In the quotation from Dr. Barry's paper descriptive of the changes which take place in the ovum after impregnation, it will be remembered that the amnion was stated to be formed by the coalescing of the layer of small vesicles formed on the inner surface of the membrane which invests the yelk, with the "mulberry-like structure formed in the centre of the yelk, but passing to its circumference." M. Coste calls the amnion a "true epidermis of the blastoderma," and states that it is detached from the external surface of the embryonic spot. The membrane thus formed envelopes the embryo very closely at an early period, and is continuous with the common integument of the fœtus, at the open abdominal parietes. At a later period, it is distended with fluid, and so separated from the fœtus; and after being reflected upon the funis, of which it forms the outer coat, it terminates at the umbilicus. In the progress of gestation, the amnion approaches the chorion, until, at last, it is in contact with it, or rather with the tunica media. It is thin and transparent, but of a firm texture, resisting laceration much more than the other membranes. Its external surface is somewhat flocculent, but internally it is quite smooth, like serous membrane, and like it, secretes a bland fluid. Neither vessels nor nerves can be demonstrated in the amnion in a state of health, though it may be presumed to possess them.

Abnormal deviations.—The researches of M. Mercier have established the fact that this membrane may be the seat of inflammation, and that in such cases it becomes vascular, and secretes a disproportionate quantity of fluid. It is not quite certain whether its quality is changed from diseased action. The membrane may also become thickened and opaque.

The Placenta.—Let us now consider the chorion at a more advanced period of gestation, and we shall find that a new organ has been developed on that part of it which is in contact with the uterus. This organ was first called the *placenta*, I believe, by Fallopius: it is a spongy vascular mass, existing in some form in all mammalia, as an appendage of the chorion. It is of considerable size at the termination of utero-gestation, its diameter being six or eight inches, its circumference eighteen or twenty-four, and its thickness from one inch to one and a half. In general it is of a rounded or oval form. Internally, its surface is smooth and shining, from its being covered by the chorion and amnion, beneath which the radiations of the umbilical vessels may be discovered. The chorion, which covers its inner surface immediately, is firmly attached to it, and sends processes between its lobes and lobules, whilst the amnion, lying over the chorion, is but loosely attached. The outer or uterine surface, if the placenta be "*in situ*" or removed carefully, is uniform and level, though not exactly smooth, being covered by the *decidua serotina;* if this be peeled off, the lobes or lobules into which the placenta is divided, are evident, and we find processes of the decidua serotina entering these divisions. The vessels of one lobe have very rarely any direct communication with those of another.

Fig. 52.

(*From Dr. Lee.*)

As to the *formation* of the placenta, we observed that the villi of the chorion diminish gradually in number, and finally disappear from every part of its surface, except where it is in contact with the uterus, at which part they become, as it were, concentrated, and grow with great luxuriance, in consequence of the development within them of vessels derived from the inner layer of the chorion (the endochorion), or from between the two layers. These vessels go on enlarging and multiplying, interlacing and anastomosing with each other, until they, with their connecting (or separating) sheaths of villi or decidua serotina, form the mass of the placenta. The vessels are divided into arterial and venous branches. The two umbilical arteries, at their insertion into the internal surface of the placenta, divide and subdivide into radiating branches, which, plunging into its substance, are minutely divided and distributed to the different lobes. It is generally stated that the ultimate radicles of the arteries terminate directly in the radicles of the umbilical vein, without the intervention of capillaries; but there is room for doubt upon this point. The radicles of the umbilical vein coalesce, until the large vessels formed by them unite in forming the umbilical vein, which is enclosed in the sheath of the funis umbilicalis with the arteries. The arteries are extremely tortuous, and the veins are without valves. It may be doubted whether the placenta is supplied with nerves, but it is pretty certain that it possesses lymphatics.

The *situation* of the placenta may be ascertained with tolerable accuracy, by the use of the stethoscope before delivery, and the examination of the perforation in the membranes afterwards. By some writers it is stated to be at the fundus, or a little on one side of it; by others at the posterior or anterior surface: it would seem, from the researches of M. Naegelè, jun., to be most frequently on the left side; next, on the right side of the uterus. He states that the stethoscope indicated the placenta to be attached to the left side, in two hundred and thirty-eight cases out of six hundred; and to the right side of the uterus, in one hundred and forty-one cases. In twenty no sound was perceptible; in one hundred and sixty it was weak, or diffused so as to be uncertain; in seven the placenta was attached to the fundus; in thirteen to the anterior wall; and in eleven cases there was placental presentation.

A much controverted question now demands our attention—viz., Whether there be direct vascular communication between the placenta and uterus? and if not, how is the aëration of the fœtal blood effected? I am afraid we cannot as yet decide the point in dispute. It was for a long time believed that the blood-vessels of the uterus and placenta communicated with each other, and that an interchange of blood took place, so that the fœtus obtained fresh blood from the mother for its own nutrition. This opinion was supported by Cowper, Noortwyk, Haller, Senac, and in modern times by Flourens.

The researches of the Monros, Hunters, Wrisberg, and others, however, very satisfactorily disproved the existence of this vascular continuity. The labours of the Hunters, in particular, threw great light upon the anatomical relations between the bloodvessels of the mother and fœtus. "They satisfied themselves," says Dr. J. Reid, in his paper,* "that the umbilical arteries terminate in the umbilical veins, and not in the vessels of the uterus;" and that the blood in the umbilical arteries "passes from them into the veins, as in other parts of the body, and so back again into the child." They further observed, that numerous small curling arteries, the largest being about the size of a crow-quill, passed from the inner surface of the uterus, that they penetrated the decidua, and opened into the interstices between the fœtal bloodvessels of the placenta. Prolongations from the uterine sinuses were also traced through the decidua, and were observed to terminate in the placenta in the same manner as the curling arteries, so that "in the umbilical portion of the placenta, the arteries terminate in veins by a continuity of canal; whereas in the uterine portion, there are intermediate cells, in which the arteries terminate, and from which the veins begin. It was therefore concluded, that the blood of the mother was poured by the curling arteries into a kind of cellular tissue, filling up the intervals between the ramifications of the fœtal placental vessels, from which it returned to the uterine sinuses of the mother through their placental prolongations, after having acted upon the blood of the fœtus through the thin walls of the umbilical placental vessels."

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* Edin. Med. and Surg. Journal, No. 146.

Lauth, Velpeau, Seiler, Coste, Radford, Ramsbotham, Millard, Noble, &c., agree with the former opinion of Dr. R. Lee, doubting the existence of these utero-placental vessels, and assume that the placenta is to be considered exclusively as the fœtal organ. Dr. R. Lee now believes that there is a direct communication between the uterine vessels and the cavernous structure of the placenta.* Dutrochet's theory of endosmose and exosmose has been adduced to explain the nature and process of the interchange of blood, but I do not believe that it is considered satisfactory by many persons.

The investigations of Weber, Eschricht, Owen, and Reid, seem rather to carry us back to a modification of the opinions promulgated by the Hunters. According to Weber, the large vessels which leave the uterus to pass into the decidua are deprived of all except their innermost tunics, which are as soft and tender as coagulated lymph. The veins form a network, and have this peculiarity, that they become wider the more deeply they penetrate between the lobules. Thus the veins themselves form cells or sinuses, into which the fœtal villi project. The delicate and yielding coat of the vein is borne inwards by each villus pressing upon its exterior, and so is itself the covering of all the villi which compose the fœtal lobules, and which seem to project into its exterior. Eschricht supposes that the utero-placental vessels divide and subdivide in the placenta like the arteries and veins in the other parts of the body. Wagner, in his Physiology, agrees pretty nearly with Weber, and describes the utero-placental vessels as winding like a network around the tufts of the chorion containing the vessels of the embryo.

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* Lectures on the Theory and Practice of Midwifery, p. 136.

The last author to whom I shall refer is the late Dr. J. Reid, from whose essay I have already quoted, and whose industry and acumen obtained for him a distinguished place among the physiologists of the present day.* In August, 1840, he carefully examined the uterus of a woman who had died in the seventh month of pregnancy. "On separating the adhering surfaces of the uterus slowly and cautiously under water, I satisfied myself, but not without considerable difficulty, of the existence of the utero-placental vessels described by the Hunters. After a portion of the placenta had been detached in this manner, my attention was attracted towards a number of rounded bands passing between the uterine surface of the placenta and the inner surface of the uterus. These bands were generally observed to become elongated, thinner, and of a cellular appearance, when put upon the stretch, and were easily torn across; while at other times, though much more rarely, they could be drawn out in the form of tufts from the mouths of the uterine sinuses. On slitting up some of the uterine sinuses with the scissors, these tufts could be seen ramifying in their interior, and were more or less elongated; many of them appearing only to dip into the open mouths of the sinuses, while others proceeded from a quarter of an inch to an inch from the open mouths of the sinuses by which they had entered, and in some cases they extended themselves into one of the neighbouring sinuses." The parts were then injected, as well as was possible, and when the branches of the tufts contained in the uterine sinuses were filled with injection, "their continuity with the umbilical placental vessels was clearly ascertained;" and an examination with the microscope proved their identity with the umbilical vessels in the placenta. As to their anatomical relations to the sinuses: "these tufts were found to protrude into the open mouths of certain of the uterine sinuses only; and it need scarcely be added, that they were observed only in those sinuses placed next the inner surface of the uterus, and not in any of the deeper sinuses. These tufts were surrounded externally by a soft tube, similar to the soft wall of the utero-placental vessels, which passed between the margin of the open mouths of the uterine sinuses and the edges of the orifices in the decidua, through which the tufts protruded themselves in the sinuses. The size of these tufts varied considerably. Some of them appeared to fill up completely the open mouths of the sinuses by which they entered, while others filled them only partially. On examining these tufts as they lay in the sinuses, it was evident that, though they were so far loose, and could be floated about, yet they were bound down firmly at various points by reflections of the inner coat of the venous system of the mother upon their outer surface." "In this uterus we ascertained that while some of the utero-placental veins contained no prolongation of the fœtal-placental vessels, in others these passed along their interior, and projected into the uterine sinuses. On tracing those utero-placental veins which contained no fœtal vessels, as far as the placental surface of the decidua, the inner coat of the venous system was seen to be prolonged upon some of the tufts of fœtal-placental vessels in their immediate neighbourhood. On tracing one of the larger of the curling arteries through the decidua, it was also observed, that when it reached the placental surface of that membrane, the inner coat of the arterial system of the mother was prolonged upon some of the tufts of the fœtal-placental vessels which projected into their orifices. Those numerous branches of the fœtal-placental vessels which reach the placental surface of the decidua, and do not pass into the uterine sinuses nor into the orifices of the uterine-placental vessels, are attached by their apices to the placental surface of that membrane." After an elaborate description of the structure of the tufts and vessels of the placenta, Dr. Reid observes, "the interior of the placenta is thus composed of numerous trunks and branches (each including an artery and an accompanying vein), every one of which, we believe, is closely ensheathed in prolongations of the inner coat of the vascular system of the mother, or *at least with a membrane continuous with it.* If we adopt this view of the structure of the placenta, the inner coat of the vascular system of the mother is prolonged over each individual tuft, so that when the blood of the mother flows into the placenta through the curling arteries of the uterus, it passes into a large sac formed by the inner coat of the vascular system of the mother, which is intersected in many thousands of different directions, by the placental tufts projecting into it like fringes, and pushing its thin wall before them in the form of sheaths, which closely resemble both the trunk and each individual branch composing these tufts. From this sac the maternal blood is returned by the utero-placental veins, without having been extravasated, or without having left her own system of vessels." "The blood of the mother contained in this placental sac, and the blood of the fœtus contained in the umbilical vessels, can easily act and react upon each other through the spongy and cellular walls of the placental vessels and the thin sac ensheathing them, in the same manner as the blood in the branchial vessels of aquatic animals is acted upon by the water in which they float." These ample quotations will, I believe, give the reader a just view of Dr. Reid's observations and opinions, and I may add, that on visiting Edinburgh, Dr. Reid had the kindness to show me one of the portions of uterus and placenta on which his investigations were made, and there was no difficulty in demonstrating the tufts, dipping into the uterine sinuses. No doubt further observations are necessary for the perfect elucidation of the subject; but I certainly think that, as far as our knowledge extends, it is in favour of the opinion adopted by Dr. Reid and the later physiologists.

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* May I be excused going so far out of my way as to recommend most cordially to my brethren the admirably-written life of this eminent physiologist, by Dr. George Wilson?

Abnormal deviations.—The placenta is liable to malformations and displacements, and to a series of diseases, some of which have been ably described by my friend Professor Simpson of Edinburgh,* Mr. Bremner,† and Dr. Elkington, and others.‡

1. It may be the seat of sudden or gradual congestion ending in resolution or in effusion of blood "into the substance of the organ, upon its uterine or fœtal surfaces, or between the membranes." Dr. Simpson suggests, that perhaps the so-called tumours, tubercles, or white spots, &c., of the placenta, of various authors, may in fact be coagula of blood in various stages of transformation. The symptoms to which placental congestion and apoplexy give rise, depend for their clear manifestation upon the extent of the hæmorrhage. In moderate cases, there is a degree of uneasiness and weight in the region of the uterus, and sometimes a fixed or intermittent pain, which may extend down the thighs. When the hæmorrhage is severe, it will be attended by the usual symptoms of loss of blood. The result to the fœtus in many cases is death, and thus the congestion may cause abortion.

2. Inflammation may attack the placenta, either in its parenchyma or membranes, or altogether, and it may either affect one lobe only, or several at the same time. It may issue in the effusion of lymph either into its substance or upon its fœtal or uterine surfaces. In the former case we have the yellow induration of the placenta; in the latter, adhesions between the uterus and placenta; and, when the fœtal surface is the seat, there may be increase of the liquor amnii, lymph on its surface, or, possibly, adhesion to some part of the fœtus. Another termination of placentitis is in the production of purulent matter, in the substance or upon the surfaces of the placenta. The most

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* Edin. Med. and Surg. Journal, vol. xlv. p. 265.

† Ibid., vol. lxxii. p. 56.

‡ Prov. Med. and Surg. Journal, May 30, 1849.

constant symptom of placentitis, is pain in the uterine or lumbar regions, and in some cases violent vomiting; in others, rigors, succeeded by febrile symptoms. Inflammation of the placenta may cause the death or malformation of the embryo, and place the mother in some danger. For more minute details I beg to refer the reader to Dr. Simpson's learned essay.

3. The placenta may be hypertrophied or atrophied in part or the whole of its substance.

4. From the researches of Kilian, Barnes,* Hassall,† Barlow,‡ Cowan, and Druitt,§ it appears that the vessels of the placenta may undergo fatty degeneration, just as the small vessels of the lungs or other parts. Dr. Hassall observes that "in the placenta affected with fatty degeneration, certain of the lobes, in place of presenting the red spongy texture of healthy tissue, exhibit a fatty appearance, and are of a yellow colour, glistening, firm, and exsanguine, while the remaining lobes present their ordinary characters, at least to the unaided eye." The minute alterations which he has detected are as follows:—"1. We observe that the villi are thickly studded with innumerable spherules of oil. 2. The chorion is much altered, it is thickened and destitute of nuclæi. 3. The walls of the vessel no longer contain nuclæi; these having, in all probability, become degenerated into spherules of oil. 4. The spherules of oil are contained, some in the chorion, some in the walls of the blood-vessels, and many in the intervals or spaces between them. 5. The cavities of the vessels are almost invariably free from fatty deposition. 6. The vessels are destitute of blood." No doubt that so far as it extends, this change is destructive to the functions of the organ; but it does not follow that the remaining healthy portion may not be adequate to the complete nutrition of the fœtus. Mr. Barlow remarks very justly, that placental apoplexy may be owing to this fatty degeneration of the vessels. Dr. Druitt and others regard this change as a natural rather than a morbid process; that it is in fact the mode of death of a temporary organ, whose functions are about to terminate.

5. It may be the seat of cartilaginous or calcareous degeneration, or of other morbid products.

6. It may give rise to hydatids.

The UMBILICAL CORD, *funis* or *navel-string*, is the connecting link between the fœtus and placenta (fig. 52), terminating with the functions of the latter, at birth. It is visible at the earliest period of pregnancy. It arises from the centre of the placenta most frequently, but occasionally from its edge (battledore placenta), and is formed by the umbilical arteries and vein, embedded in (the Whartonian) gelatine, and enclosed within a sheath of the chorion internally, and of the amnion externally. Besides the vessels, it contains the duct of the umbilical vesicle and the urachus, the omphalo-mesenteric vessels, and, at an early period, the fœtal intestines at its fœtal extremity, but not a trace of nerves as Dr. Simpson has shown. At first, the cord is thin and cylindrical, the vessels running a straight course through it; from the third to the ninth week, it appears to be divided by two or three vesicular swellings, which ultimately disappear. After this time, the vessels run in a spiral form, the arteries around the vein, from left to right, and form in their course a number of small loops or knots. The vein has no valves, and its calibre is equal to that of both the arteries. The cord is also supplied with lymphatics, as has been proved by the injections of Fohmann and Montgomery. It is probable, though not as yet demonstrated, that it may possess nerves also.

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* On Fatty Degeneration of the Placenta, &c., Med.-Chir. Trans., vols. xxxiv. and xxxvi.

† Microscopical Anatomy.

‡ Med. Times and Gazette, Oct. 30, 1852, p. 432.

§ Med.-Chir. Trans., vol. xxxvi. p. 99.

The length of the cord varies much; it is very rarely less than eight inches, though such cases are on record, and it is sometimes five or six feet long. Out of 500 cases, selected from the writings of Osiander, Adelmann, and Henne, with some additional measurements of my own, I find the most common length to be eighteen inches; none were under twelve, nor above fifty-four inches. Dr. Storer has found the most common length to be two feet; next, twenty-six inches; next, twenty-three inches; the shortest was four and a half inches, and the longest forty-three. Dr. G. Thompson, of Boston,* mentions one of five feet nine inches; Mr. Rouse one of fifty-one and a half inches, which was coiled six times round the neck;† and Dr. Tyler Smith, one of fifty-nine and a half inches. Mr. Anderson Smith‡ found that four-fifths of his cases were between eighteen and thirty inches.

By most writers, the pulsation of the arteries of the cord is considered to be dependent upon the heart; but Osiander contends that they are to a certain degree independent, and some facts which he adduces appear to afford confirmation to his opinion. After the birth of the child, the pulsation ceases in about fifteen or twenty minutes, and that portion of the cord which remains attached to the umbilicus, dies and gradually withers, until it falls off, in the majority of cases, on the fifth or sixth day.

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* Boston Med. and Surg. Journal., vol. xlii. No. xxii. p. 451.

† The Lancet, Sept. 1, 1855.

‡ Ibid. Oct. 8, 1861, p. 425.

In ordinary cases the funis lies free and loose in the cavity of the amnion, above the head of the child; but occasionally, owing to the movements of the child at an early period, it may be coiled round its neck, tied in knots, or escape below the head, so as to prolapse during labour. The coiling round the neck happens about once in nine or ten cases; or, according to the examples I have collected, 204 times in 1920 cases. Dr. Weidmann states that in 28,130 deliveries there were 3230 cases of coiling round the neck, and 149 around other parts of the body. He attributes it to a long funis, abundant liquor amnii, and a small child.* Mr. Anderson Smith† found 45 cases of coiling round the neck or body in 1625 cases, or one in thirty-six. It is commonly enumerated among the causes of delay in labour,‡ on account of the shortening of the cord which it occasions, and sundry other evil effects are attributed to it, which I believe to be altogether imaginary, for the coiling does not occur except when the cord is longer than usual, so as to leave enough of it free. For more minute details I take the liberty to refer the reader to an essay on the subject in my Researches on Operative Midwifery, &c.

Abnormal deviations.—1. The vessels of the cord may divide at some distance from the placenta: 2, instead of two arteries and one vein, there have been found two veins and one artery, one vein and one artery, or three arteries: 3, two cords have been attached to one placenta with a single child: 4, the cord may be tied in double or single knots: 5, the vessels are sometimes partially or wholly closed: 6, cases are on record of the absence of funis and umbilicus: 7, in an acephalous fœtus born in the Western Lying-in Hospital, we found the cord inserted into the neck, near the angle of the jaw, from whence the vessels passed down behind the clavicle and sternum, through the chest into the abdomen, where they were lost: 8, when the umbilical ring is imperfectly closed, the sheath of the cord sometimes contains a portion of the intestines: 9, in cases of twins, the placenta and cords are generally distinct, and without communication, but occasionally a cross branch passes from one to the other: 10, the cord may be inserted into a part of the chorion, covered by the decidua reflexa, instead of that part upon which the placenta is to be developed: 11, the cord may be so much twisted (at an early period) as to diminish the calibre of the vessels, and to impair the nutrition of the embryo: 12, the vessels may become varicose, or the sheath of the cord may contain hydatids: 13, the coats of the vessels may give way, and hæmorrhage ensue: 14, the cord may be torn across, by the mother's falling or receiving a violent concussion.

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* Med. Times and Gazette, July 18, 1857.

† Lancet, Oct. 8, 1864, p. 425.

‡ Lee's Lectures on Midwifery, p. 121.

The ALLANTOIS "arises on the fore part of the posterior extremity of the mucous layer which is closing to form the intestine, as a growth of the intestine, which proceeds very rapidly. It passes out where the ventral laminæ are still unclosed, in the region of the umbilicus, and in birds and mammalia reaches either mediately or immediately the inner surface of the exochorion. By the constriction of the navel it is separated into two portions, which communicate; that within the body of the embryo is the sacculated urinary bladder, with the urachus or tube of communication. It receives its vessels from the hypogastric, which are spread out as a vascular layer, especially upon that portion of its surface which faces the exochorion. According to Burdach (as we have seen) the vessels form a distinct layer, the endochorion." I have preferred quoting this concise description from an article in the Brit. and For. Med. Review, as giving a good account of the opinions held by most recent physiologists, to embarrassing the reader by a detail of the different hypotheses which have been broached upon the subject.

The LIQUOR AMNII is the name given to the fluid secreted by the amnion, and contained in its cavity. At first, it is small in quantity, clear and transparent; but afterwards it increases in quantity, and becomes slightly opaline. Dr. G. O. Rees has published, in No. 6 of Guy's Hospital Reports, an analysis of some amniotic fluid which he obtained in a case where premature labour was induced. He found its specific gravity 1008·6, and in 1000 parts it contained—

Of water	983·4
Of albumen, with traces of fatty matter . .	5·9
Albuminate of soda, chloride of sodium . . .	6·1
Animal extractive, soluble in water and alcohol, urea, chloride of sodium	4·6
With traces of alkaline sulphate.	

Towards the end of gestation the albumen diminishes.

Professor Scherer has published an analysis of liquor amnii at the fifth month of gestation, and at the full time, as follows:—

	At five months.	At nine months.
Water	975·84	991·474
Solids	24·16	8·526
Albumen	7·67	0·82
Extractive	7·24	0·60
Salts	9·25	7·06*

The amount at the full time varies from half a pint to several quarts; but the average quantity is about a pound. The fluid is usually stated, and I believe truly, to be a secretion from the inner surface of the amnion; but Meckel attributes it to the maternal vessels, especially in the earlier months.

The *uses* of the liquor amnii are very intelligible and important: 1, it is probable that it serves for nutriment to the fœtus, at least during the early months; 2, it preserves an equable temperature for it, during its intra-uterine life; 3, it diminishes the impression from sudden movements, shocks, &c., and thereby prevents injury; 4, during labour it protrudes the membranes, and is the primary agent in dilating the os uteri.

Abnormal deviations.—It may be very scanty, or, in the opposite extreme, excessive. The latter deviation from its natural state is probably the result of inflammation, and occasions some mechanical inconveniences to the mother, and risk to the child during gestation, whilst at the time of labour it seems to enfeeble the uterus during the first stage. The quality of the fluid may be changed, though it rarely decomposes. Its colour is sometimes yellow or brown.

The EMBRYO.†—If the reader will take the trouble to turn back to p. 79, he will find that in the quotation from Dr. Barry, the last change there described as occurring after impregnation, was the disappearance of the germ vesicle. When the vesicle bursts in the hen's egg, the formation of the *germ-membrane*, or *blastoderma*, commences, according to Purkinje, and it is completed by the fifth day, according to Von Baer. In mammalia, however, it appears to exist previous to the bursting or disappearance of the vesicle; at least it is visible immediately the vitellus becomes transparent after that occurrence. Between this membrane and the chorion there is a thin layer of albumen, and at some point we find an aggregation of granules, forming the cumulus of the blastoderma. It is at this part that the embryo is developed, lying as it were upon the membrane. The form of the germinal membrane gradually changes, becoming more oval. It consists of three superimposed laminæ or layers, at least at the central point or cumulus; and upon this separation into layers rests the modern theory of development, as first proposed by Döllinger and Pander, and afterwards illustrated by Von Baer, Rathke, Burdach, &c. &c. "Above, and most extended," says the author of the very able article in the Brit. and For. Med. Review, from whom I have already quoted, "is the *serous* layer; below and least extended is the *mucous;* between the two, and later in its appearance, is the *vascular* layer. In one or other of these, as distinct primitive forms, there lies concealed that which is essential in the different organs and tissues of which the body is composed, and in virtue of which they admit of being referred to distinct original groups. On the serous layer, arise the organs of animal life—the brain and spinal cord, organs of sense, skin, muscle, tendons, ligaments, cartilage, bone; on the mucous, the organs of vegetative life, the intestinal canal, lungs, liver, spleen, pancreas, and other glands. The heart and vascular system arise from the vascular layer, if this is to be considered as a separate one. To which division the generative system is to be primarily referred, is still undetermined." This is the view generally accredited, but Dr. Barry seems to think it doubtful. He has not observed this "splitting of the germinal membrane," nor does he conceive that the membranous layers originate the embryo, but the reverse: that the "previously existing germ, by means of a hollow process, originates a structure having the appearance of a membrane."

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* Medical Times, Aug. 7, 1851, from Schmidt's Jahrbücher, vol. lxvii. p. 7.

† For a more minute account of the moderate researches on the subject of embryonic development than I have been able to give, I must refer my readers to Drs. Baly and Kirkes' Supplement to Müller's Physiology.

In the centre of the blastoderma, where it is supposed to divide into the serous and mucous layers, there is observed a clear space, the *area proligera* or *pellucida,* in the centre of which, and in the transverse axis of the vitellus, there is a mass of globules, loosely connected together, forming the *primitive streak* or *trace* of Von Baer, and around this the *area vasculosa* is developed. I may mention that these changes have been observed in the ova of different mammalia, as well as in the egg; and there is every probability that the human ovum undergoes identical mutations.

The appearance of the primitive trace is observed in eggs at about the fourteenth hour of incubation, and in the human ovum may probably be referred to the second or third week.

To proceed with the next changes: "The globules of the primitive streak seem next to be resolved, and then there is a change of appearances. On the sides of the streak are two *laminæ dor-*

sales, which bound a median furrow; and below this furrow is the *chorda dorsalis,* which is the axis of the future embryo, and the origin of the spinal column. That portion of fluid which separates the chorda dorsalis from the lamina dorsalis is the future cord and brain. The chorda dorsalis thickens at the fore part, to form the first appearance of skull, and the fluid between the dorsal laminæ is in larger quantity, in correspondence with it; so that the central parts of the nervous system and their coverings are laid down at the same time, and grow simultaneously. The separation between the spinal cord and brain is a very early one, and is coincident with a bending downwards towards the yelk, of the anterior part of the laminæ dorsales, which defines the limit between the skull and column, brain and cord."

Next follows the closing of the laminæ dorsales over the fluid which is the rudiment of brain and cord. The brain, therefore, as Valentin remarks, ought not to be considered as growing from one end of the cord. "At first there is only a single cerebral vesicle; for in the brain, as well as in the cord, granules accumulate first on the periphery, the central part continuing to be fluid. The single vesicle is then elongated, and next appears constricted in certain regions, so as to form three cells, which communicate. The anterior cell corresponds to the cerebrum, the middle cell to the corpora quadrigemina and neighbouring parts, and the posterior cell to the medulla oblongata and neighbouring parts." "The deposit of granular matter which accompanies the further development of the brain and cord, is seen on that side of both which corresponds to the viscera, sooner than on that which corresponds to the spine."

"Two other laminæ (*laminæ ventrales* of Von Baer) are in the meantime proceeding from the axis of the embryo, one on each side. They grow out laterally, and tend to converge in the median line, as did the dorsal laminæ; but they form a larger curve, and follow a different direction—that is, they converge to meet *below* the axis, and they do so meet, except in the umbilicus."

After the rudiments of organic life have been commenced in the central portion of the serous layer, a fold of its peripheral portion arches over the dorsal surface of the embryo, "so as to represent a sac whose opening is at the edge of the fold." The opening gradually decreases until the opposing folds of membrane are in contact, and then vanishes, leaving the fœtus surrounded by two membranes. The one next to the fœtus is the *amnion;* the other is gradually separated from the amnion, and joins the serous lamina of the blastoderma; this is the "false amnion" of

Pander, or the "serous covering" of Von Baer. This mode of formation of the amnion has been observed by Von Baer in the dog, sheep, and pig; and his observation has been verified by Dr. Allen Thompson.

The membrane which surrounds the vitellus or yelk is very vascular; it becomes oval in shape, and more pointed where it is in contact with the embryo, until at length it contracts into a narrow duct, thus forming the *vesicula alba* and *duct*.

The *allantois*, as already mentioned, arises from the lower end of the intestinal canal on a little vesicle, and increasing in size, encircles the embryo along with the umbilical vesicle.

The heart of the embryo, which is the product of the vascular layer of the blastoderma, is formed at an early period; at first it appears as a twisted canal; at the under side it receives two omphalo-mesenteric veins, and in the situation of the future *bulbus aortæ* it divides into four vascular arches, which first uniting into the aorta, again divide, run down near the vertebral column, and give off the omphalo-mesenteric arteries, which ramify on the blastoderma and umbilical vesicle.

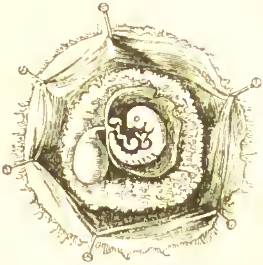
Thus, then, we have seen the embryo developed in the layers of the blastoderma, and formed by a gradual closing in of the laminæ towards the median line; the brain and spinal marrow, which are its earliest rudiments, are covered in, and in like manner the parts anterior to the spine, as the thorax, abdomen, &c., are formed. We are indebted to comparative anatomy for opportunities of observation; but there is no doubt that the same process takes place in the human ovum. Professor Wagner has given a description of a human ovum of about three weeks old, part of which I shall take the liberty of quoting: "Such ova, still surrounded by decidua, measure about seven lines in length; in the naked chorion, they are about five lines long. The chorion at this time is beset externally with small cylindrical hollow villi. The embryo itself is two lines long. It is plainly surrounded by an amnion, which lies loosely, but still pretty closely about it, and obviously proceeds from the abdominal laminæ. The embryo is curved, and presents anterior cerebral vesicles or hemispheres, pretty well developed (figured rather large in figs. 53, 54), and considerable corpora quadrigemina immediately behind them; there is the distinct appearance of an eye, and a rounded offset from the medulla oblongata indicates the acoustic

Fig. 53.

(*From Velpeau.*)

vesicle; several branchial arteries and fissures are also conspicuous, the last of them, however, not completely formed. The oral aperture is just above the upper branchial fissure. The anterior and posterior extremities are curved leaf-like processes, still of very small dimensions." The abdomen is yet an open cleft, in which, but projecting beyond it, is the heart, "of very large relative dimensions, and consisting of a simple atrium, or auricle, and ventricle; behind the heart is the liver, and under the liver the intestine, which is attached by means of a distinct mesentery." Where the large and small intestines meet, the canal makes a sweep in the umbilical vesicle. On either side of the mesenteric lamina, we find the primordial kidney, composed of short cæca. The allantois is seen extending from the lower part of the intestine.

Fig. 54.



(*From Velpeau.*)

During the second month, we find the extremities larger and more projecting; the body curved, the head disproportionately large, and bent downwards, indications of the nostrils, and a

Fig. 55.

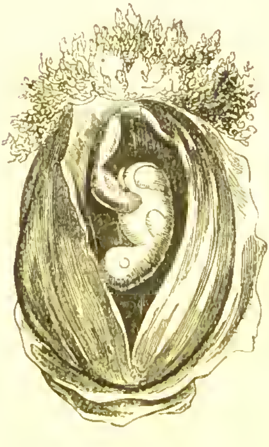
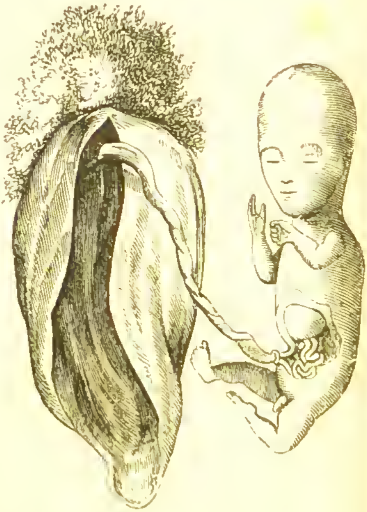


Fig. 56.



(*From Velpeau.*)

gaping oral aperture. The abdomen is closed about the fifth week, except at the umbilical aperture, through which a loop of intestine still escapes. The os coccygis resembles a tail, bent forward, and of considerable size.

The forehead is more vaulted, because of the development of the hemispheres of the brain; the spinal cord is cylindrical, of nearly uniform thickness, and terminating in a blunt extremity; posteriorly it is open. "The medulla oblongata makes a bend forwards at the top of the neck, and then ascends perpendicularly into the capacious cranium, where the corpora quadrigemina present themselves, as two large semi-globular masses, having behind them a pair of narrow lateral laminæ, the rudiments of the cerebellum. The medullary stem, or crus cerebri, passes under the corpora quadrigemina, and again bending downwards, the corpora striata and optic thalami are evolved upon it."

The first points of ossification appear about the seventh week, in the clavicle and lower jaw; the vertebral arches are not yet closed in, and the ribs appear like little streaks. The only trace of muscular fibre is in the diaphragm. The heart at this time begins to change its shape, and the inter-ventricular septum to form. The liver is very large and granular. The stomach is assuming somewhat of its normal figure; the urinary bladder is enclosed, but the anus is imperforate.

After this period, the different parts are developed with tolerable rapidity; the separate portions of the brain are evolved, and the organs of sense acquire their external characters; the eyelids, nose, and ears are formed. About the seventh month, the membrana pupillaris is ruptured, and the pupil becomes visible. The cranium continues cartilaginous for some time, then points of ossification are seen, which radiate until each bone is nearly complete.

The upper and lower extremities increase, the hands and feet are developed; the fingers and toes separate, and the nails become distinct about the sixth or seventh month.

In front of the coccyx we find the anus, which at first is imper-

Fig. 57.

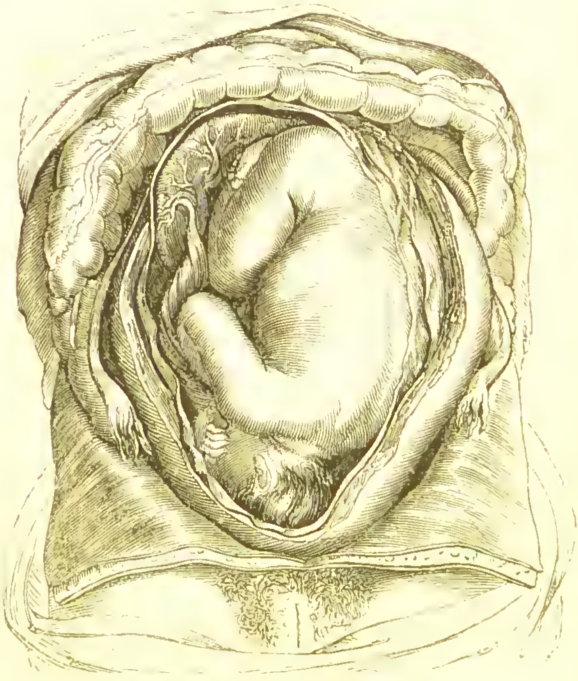
(*From Velpeau.*)

forate; and anterior to it, the organs of generation, in form at first of a conical tubercle, which is subsequently developed into the penis or clitoris, while the skin at the sides is prolonged into the scrotum or labia. The testes are originally placed on each side of the vertebral column, but afterwards descend along the iliac vessels to the inguinal ring, through which they pass, carrying with them a portion of the peritoneum to form their tunica vaginalis.

The liver and kidneys are completed before the termination of pregnancy, and soon commence the performance of their functions; for the meconium is found to be coloured by the bile even in premature children, and urine is frequently voided during delivery.

It was formerly asserted that the *position of the child* in utero during the early months was sedentary, facing anteriorly; and that towards the end of gestation, owing to the greater weight of the head, and to its voluntary efforts, it made a revolution, so as

Fig. 58.



(*From Dr. Ramsbotham.*)

to present with the head. This, however, is not the case. With some exceptions, the position of the child is unaltered from an early period of pregnancy to its termination, whether the head be upwards or downwards. The arms are generally folded over the chest, the knees drawn up to the abdomen, the back curved, and the head bent upon the chest, so as to occupy as little space as possible. In ordinary cases, the face and anterior surface of the child neither look forward, as was formerly supposed, nor in the direction of the transverse diameter of the pelvis, as is sometimes stated, but obliquely; so that in the first and second *position* the *back* of the fœtus is turned partly forwards; and the *chest* in the third and fourth. This point having been established by observation, we are enabled in many cases to ascertain the position of the infant before labour has commenced, by means of the stethoscope, according as the pulsation is heard at one side or other of the abdomen, and more or less clearly.

Various *causes* of the position of the fœtus in utero have been mentioned, such as gravitation, voluntary movements, &c.

Although the supposition that the greater weight of the head is the cause has the high authority of Dr. Hunter,* I do not think it can be maintained, any more than Ambrose Paré's notion, that it was owing to its efforts to escape† from the uterus; or M. Dubois' view, that it is the result of an instinctive and voluntary determination on the part of the fœtus.‡

Drs. M'Clintock and Hardy§ have furnished data, in addition to those we already possess, for the subversion of the first of these opinions, and the latter appears to me to require proof rather than an answer. M. Cazeaux regards the shape and mode of enlargement of the uterus as the chief, if not the only cause of the position of the fœtus—that it is not an "instinctive but a mechanical" arrangement.||

But the entire question has been investigated by my friend Dr. Simpson, with elaborate care and great acuteness, and I confess that his conclusions appear to me more comprehensive and more correct than any preceding authority. They are as follows:—"1. The usual position of the fœtus, with the head lowest and presenting over the os uteri, is not assumed till about the sixth month of intra-uterine life, and becomes more frequent and more certain from that time onwards to the full term of utero-gestation. 2. Both the assumption and maintenance of this

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* Description of the Gravid Uterus, p. 66. † Works, Trans., p. 889.

‡ Mém. de l'Academie de Médecine, vol. ii. p. 280.

§ On Midwifery and the Puerperal State, p. 4.

|| Traité des Accouchemens, p. 148, Brussels Ed.

position are vital and not physical acts, for they are found dependent on the existence and continuance of vitality in the child; concurring with its life, but being lost by its death. 3. In human physiology we do not know or recognise any vital power or action, except muscular action, capable of producing motions calculated to alter or regulate the position, either of the whole body or of any of its parts; and further, the motory muscular actions of the fœtus are not spontaneous or voluntary, but reflex or excito-motory in their nature, causation, and effects. 4. The position of the fœtus, with the head placed over the os uteri, is that position in which the physical shape of the normal and fully-developed fœtus is best adapted to the physical shape of the normal and fully-developed cavity of the uterus. 5. This adaptive position of the contained body to the containing cavity is the aggregate result of reflex or excito-motory movements on the part of the fœtus, by which it keeps its cutaneous surface withdrawn as far as possible from the causes of irritation that may act upon it as excitants, or that happen to restrain its freedom of position or of motion."* And the mal-positions and mal-presentations he attributes to:—"1. Prematurity of the labour, parturition occurring before the natural position of the fœtus is established. 2. Death of the child in utero, or, in other words, the loss of the adaptive vital reflex actions of the fœtus. 3. Causes altering the normal shape of the fœtus or contained body, or causes altering the normal shape of the uterus or containing body, and thus forcing the fœtus to assume, in its reflex movements, an unusual position, in order to adapt itself to the unusual circumstances in which it happens to be placed. 4. Preternatural presentations are occasionally the result of causes physically displacing either the whole fœtus or its presenting part, during the latter periods of utero-gestation or at the commencement of labour."

The length of a full-grown fœtus is from 18 to 22 or 24 inches.
The longitudinal diameter of its head (1 2) is from 4 in. to 4½ in.

The transverse	3½	to 4
The occipito-mental or oblique (3 4)		5
The cervico-bregmatic (5 6)	4	to 4½
The trachelo-bregmatic	3½	to 4
The inter-auricular		3
The fronto-mental (7 8)		3½
The transverse diameter of the shoulders . .	4¾	to 5½
,, ,, ,, ,, hips	4	to 5

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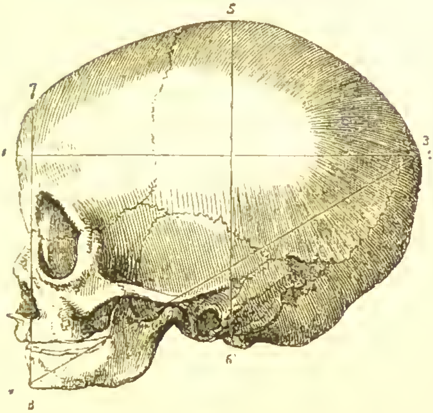
* Ed. Monthly Journal of Med. Science, vol. ix. p. 867.

Fig. 59.



(*From Maygrier.*)

In general, it may be observed, that all the measurements are less in female than in male children.

The weight of a full-grown child at birth varies in the same and in different sexes. Rœderer found the average weight in Germany to be from seven to eight pounds. Dr. Joseph Clarke, in the Lying-in Hospital, Dublin, ascertained the weight of the majority to be about seven pounds, but that it varied from four to eleven pounds. In France, the average weight is less; according to Camus, it is six pounds and a quarter, and observations at La Maternité have confirmed this estimate. In Brussels it is six pounds and a half; but in Moscow, nine pounds and one-fifteenth. Dr. Beck states that the average weight in America exceeds seven pounds.

Dr. Elsbæsser, of Wurtemberg, has published some extensive researches on this subject: he found in 1000 children at birth, that 13 weighed from 4 to 5 pounds; 58 from 5 to 6; 17 from 6 to 7; 318 from 7 to 8; 83 from 8 to 9; and 11 from 9 to 10 pounds, giving an average of 4 pounds 14 ounces. (The Wurtemberg pound is rather more, and the inch rather less, than the English.)

The maximum length of males	in 1000 children	was	19 in.	17 lines.
,, ,, ,, females	,,	,,	19 ,,	1 ,,
The minimum length of males	,,	,,	14 ,,	15 ,,
,, ,, ,, females	,,	,,	14 ,,	9 ,,*

Dr. Storer, of Boston, found that in 222 males the average weight was $7\frac{1}{2}$ pounds, and in 184 females the average weight was $7\frac{1}{9}$ pounds.[*]

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* Edin. Monthly Journal of Med. Science, vol. iv. p. 803.

Dr. Hecker states that the average weight of children of pluriparous females exceeded that of first-born children, and Dr. Matthews Duncan's calculations give the same apparent result, but further investigations rather prove that the mother's age is the determining influence. The fecundity of women increase to about the age of 25, and the weight of the child increases to its climax in the age of from 25 to 29. So with the length of the child. There is no great difference between the children of primiparæ and multiparæ, but the length of the children increases as the age of the mother up to 25 or 29; after which both weight and length diminish.[†]

The umbilicus changes its relative position as the development of the fœtus proceeds, until at birth it is near the middle of the entire length of the child. According to Chaussier, Bigeschi, and others, this relative position of the umbilicus is a test of its maturity, being distant from the central point in proportion to its immaturity. But it seems doubtful whether this position is so exactly central in mature children as these authors state; for M. Moreau has recently measured 500 children, born at the full term in La Maternité, Paris, and of this number he found only four in whom the umbilicus was exactly central. In the remainder, the point of insertion of the funis fell on an average from eight to ten lines below the middle. In a few children born about the sixth or eighth month, the umbilicus was central.

Dr. Elsbæsser examined 200 children, and found that the length of the supra-umbilical portion was—

In the males	9 in. $2\frac{1}{2}$ lines.
In the females	9 ,, ,, ,,

The infra-umbilical portion was—

In the males	7 in. 9 lines.
In the females	7 ,, 7 ,,

So that the difference in the length was—

In the males	1 in. 3·40 lines.
In the females	1 ,, 3·57 ,,

Dr. Storer found the average length of males was eighteen, and of females twenty inches.

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[*] Report of the Boston Lying-in Hospital, Amer. Journal of Med., Oct. 1850.

[†] The Weight and Length of the Newly-born Child in Relation to the Mother's Age, by Dr. Matthews Duncan.

The *characteristics of the maturity and perfection* of a child at birth, according to Fodcrè and Capuron, are, its ability to cry as soon as it reaches the atmospheric air, or shortly after; to move its limbs with facility and more or less strength, its body being of a clear red colour; the mouth, nostrils, eyelids, and ears, perfectly open; the bones of the cranium possessing some solidity, and the edges of the fontanelles not far apart; the hair, eyebrows, and nails, perfectly developed; the free discharge of the meconium a few hours after birth, and finally, the power of swallowing and digesting, indicated by its seizing the nipple or finger placed within its mouth.

The child may be considered *immature* when its length and volume are much less than those of an infant at the full term; when it does not move its limbs, or makes any feeble motions; when it seems unable to suck, and has to be fed artificially; when its skin is of an intensely red colour, and traversed by numerous bluish vessels; when the head is covered with down, and the nails are not formed; when the bones of the head are soft, and the fontanelles widely separated; the eyelids, mouth, and nostrils closed; when it sleeps continually, and an artificial heat is necessary to preserve it; and when it discharges its urine and meconium imperfectly.

There are cases on record of children prematurely born at the fifth and sixth month of gestation attaining maturity; but ordinarily we do not consider a child "*viable*" until about the seventh month of utero-gestation.

The *proportion of the sexes* in Europe, according to the learned M. Quetelet, is about 106 males to 100 females, nor does it appear that in this part of the world climate has much influence. At the Cape of Good Hope female births predominate among the free inhabitants, and male births among the slaves. A country life seems to favour the production of male progeny; and the relative ages of husband and wife exert a decided influence; for the proportion as the husband is younger than the wife, girls predominate, and within certain limits, a disproportion the other way has the opposite effects; or, as Mr. Sadler has expressed it, upon a mean number of births, the sex of the child is that of the parent whose age is in excess.

The season of the year seems to influence to some degree both the number of births and the greater proportion of male children. In Philadelphia the greatest number of conceptions occur in the spring months, and the greatest excess of male conceptions in the winter season.*

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* Trans. of American Med. Association, vol. iii. p. 93.

The number of twin cases at La Maternité was 444 in 37,441 cases, or 1 in 84; in the Dublin Lying-in Hospital, 2101 cases in 134,908, or about 1 in 64; in the same number 29 triplet cases occurred, or 1 in 4652; and 1 case of quadruplets.

Dr. Matthews Duncan* has educed the following laws as to the production of twins from elaborate investigations:—

"1. The largest number of twins is produced by women of from twenty-five to twenty-nine years of age; and on each side of this climax of fertility in twins there is a gradually increasing falling off in their number, as age diminishes on the one side and increases on the other.

"2. Twins are not regularly distributed among births generally; their production, therefore, is not subjected to the same laws as govern ordinary fertility.

"3. The mean age of twin-bearing mothers is greater than that of mothers generally.

"4. Twins increase in frequency as mothers become older. This forms a striking contrast to the fecundity of a mass of wives (not mothers) which diminishes as their age increases.

"5. Newly-married women are more likely to have twins the older they are.

"6. While the fecundity of the average individual increases with age till twenty-five is reached, and then gradually diminishes, there is some probability that the opposite is true, so far as regards twins alone, fertility in twins being greatest when fecundity is least, and *vice versâ*.

"7. The actual number of twins born of a mass of women in different pregnancies decreases as the number of the pregnancy increases.

"8. The number of twins relatively to the number of children born in different pregnancies increases with the number of the pregnancy. In other words, a woman is more likely to have twins in each succeeding pregnancy than in the former pregnancy. The first pregnancy, perhaps, forms some exception to this rule.

"9. In an individual twin-bearing is, of course, a sign of high fertility at the time. It also, in a mass of women, shows a high amount of fertility, at least till the time of the birth of the twins.

"10. It is probable, though not proved, that twin-bearing women have larger families than women uniformly uniparous."

The mean proportion of still-born children in the cities of

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* On some Laws of the Production of Twins.

Europe is about 1 in 22 births; the extreme variations is from 1 in 11 at Strasburg, to 1 in 36 at Stockholm. In the Lying-in Hospital in this city, from its establishment in 1757 to 1836, there occurred 8021 still-born children in 134,908 cases, or about 1 in 17. The number of still-born males is greater than that of females: in West Flanders and at Berlin in the proportion of 14 to 10.

The PHYSIOLOGY of FŒTAL LIFE is simply that of organic nutrition; at first by superficial imbibition, afterwards probably by absorption by the villi of the chorion, and ultimately by the changes made in or additions to the fœtal blood in the placenta. The sources of nutriment during the earliest period of embryonic life are the vitellus, or the fluid in the umbilical vesicle, and possibly the gelatinous matter (tunica media) between the amnion and chorion. After the formation of the amnion, its fluid may possibly contribute to this end. Dr. Montgomery, as we have seen, suggests that the milky fluid contained in the decidual cotyledons may also be available for this purpose. There is no doubt of the functions of the placenta: there the blood of the fœtus is renovated from that of the mother, in the same way as the blood of fishes is aërated by the water passing through the gills. Whether, in the earlier months, absorption is carried on by the surface alone, or whether, as Velpeau suggests, a portion of the liquor amnii finds its way into the stomach, may be difficult to decide, but that a certain amount of digestion is carried on, is impossible to doubt.

Before describing the *circulation in the fœtus*, there are certain anatomical peculiarities which demand our notice:—1. There is a supplementary vein, situated at the thick edge of the liver, and leading from the umbilical vein to the vena cava ascendens, called the *ductus venosus;* 2. The septum between the auricles is imperfect, having in its centre a valvular oval aperture called the *foramen ovale;* 3. The pulmonary artery, soon after its origin, gives off a branch, the *ductus arteriosus,* which enters the aorta just below its arch. The general effect of these peculiarities is to render the heart virtually a single one, to provide for the quiescent state of the lungs, and to modify the distribution of fresh blood.

Different opinions have been given as to the course of the blood in the fœtus: I shall mention first, Sabatier's and Winslow's. Sabatier's figure-of-8 circulation is thus described by Dr. Flood:— "The blood of the fœtus is conveyed from the placenta by the umbilical veins to the liver, through which it circulates, and then passes into the inferior cava. A portion of it, however, is transmitted, in a comparatively pure state," through the ductus venosus, "which opens into the left hepatic vein, and then into the inferior cava. From the inferior cava the blood ascends into the right auricle, then by the foramen ovale into the left auricle, left ventricle, and arch of the aorta. A portion of the blood thus carried into the aorta descends into its thoracic part; the rest, after circulating through the head and upper extremities, returns by the superior cava to the right auricle, and passes thence into the right ventricle and pulmonary artery. A small part of this blood goes to the lungs by right and left branches; but the rest, conveyed by the ductus arteriosus, joins the blood that we left descending through the thoracic and abdominal aorta, and all that is not employed in the nutrition of the body and lower extremities, is returned by the hypogastric arteries to the placenta." The object of this theory is to show that the head and superior extremities receive a supply of purer blood, which they are supposed to need for their development; but there are great objections in the way:—1. Even supposing the pure blood were conveyed in the manner stated, it is too small in quantity to answer the purpose, being only one-fifth of the whole; 2. Supposing it to be sufficient, the presumed effects are not produced, the intestines, ribs, &c., being just as perfectly formed at birth as the brain; and 3. No such transmission of pure blood across the auricle, through the foramen ovale, can take place, because of the effects of gravity, the descending current from the superior cava, and above all, because of the active contraction of the right auricle. In Winslow's explanation, it is assumed that the heart is virtually single and the blood mixed. According to him, "The blood of the system generally passes from the superior and inferior cava into the right auricle. One part of this is transmitted through the right ventricle and pulmonary artery, and thence (except a supply for the nourishment of the lungs) through the ductus arteriosus into the descending aorta; a second and larger part passes through the foramen ovale into the left auricle, then into the left ventricle and arch of the aorta, the branches of which supply the head and upper extremities. The continued stream passes into the descending aorta, mixing with that already described; and all of it that is not employed in the nutrition of the body and lower extremities, is re-conveyed by the umbilical arteries to the placenta."

Dr. Carpenter, the most recent, as he is certainly one of the ablest, of our physiologists, thus describes the circulation:—"The fluid brought from the placenta by the umbilical vein is partly conveyed at once to the ascending cava by means of the ductus venosus, and partly flows through the vena porta into the liver, whence it reaches the ascending cava by the hepatic vein. Having been thus transmitted through the two great depurating organs, the placenta and the fœtal liver, it is in the condition of arterial blood; but being mixed in the vessels with that which has been returned from the trunk and lower extremities, it loses this character in some degree by the time it arrives at the heart. In the right auricle which it then enters, it would be also mixed with the venous blood brought thither by the descending cava, were it not that a very curious provision exists to prevent (in a great degree, if not entirely) any such further dilution. The Eustachian valve has been found, by the experiments of Dr. John Reid,* to serve the purpose of directing the arterial blood which flows upward from the *ascending cava,* through the foramen ovale, into the left auricle, whence it passes into the *left* ventricle; whilst it also directs the venous blood, that has been returned by the *descending cava,* into the right ventricle. When the ventricles contract, the arterial blood which the left contains is propelled into the ascending aorta, and supplies the branches that proceed to the head and upper extremities before it undergoes any admixture: whilst the venous blood contained in the right ventricle is forced through the pulmonary artery and ductus arteriosus into the descending aorta, mingling with the arterial current which that vessel previously conveyed, and passing thus to the trunk and lower extremities.†

The circulation of the fœtus is independent of that of the mother, though it may be sympathetically affected. By applying the stethoscope to the abdomen of the mother, we can hear the fœtal heart, which beats from 120 to 140 times in a minute; sometimes, but rarely, it is 150 or 160. The sounds audible, however, are double this amount, inasmuch as the beat is double; the first sound is short, feeble, and obscure, the second comparatively loud and distinct; the first is inaudible a little distance from the fœtal heart; the second is audible over a great part of the abdomen, and it is the second which is generally counted; in fact, it is impossible to count both, from their extreme rapidity. The rhythm of these sounds in utero is quite different from what it is in the adult—*i.e.*, the first is quick and the second prolonged, or the first is soft and the second sharp, and then an interval nearly equal to the two sounds. Shortly after birth a remarkable change in rhythm takes place; the first sound becomes longer and is about equal in strength and loudness to the second, and the two divide the period of pulsation equally: *e.g.*, if in utero, we divide this period into 1. 2—3. 4 parts; the first and second sound occupy 1. and 2, leaving 3 and 4 for the interval. After birth, the two sounds occur as $\dot{1}$ 2 $\dot{3}$ 4. As the child advances in age, the rhythm is again changed to that of the adult. Dr. M'Clintock* has proved, by extensive observations, that the frequency of the heart's action diminishes after birth until it attains the usual standard of infancy.

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* Anat. Phys. and Path. Researches, chap. ix.

† Principles of Human Physiology, p. 1035.

After birth remarkable changes take place. From the painful impressions on the surface and senses, efforts are made by the child, which cause inspiration and end in crying, by which means the lungs are more or less inflated, and space is afforded for the pulmonary circulation, which supersedes the use of the foramen ovale and ductus arteriosus: the blood from the lower extremities cannot pass through the umbilical arteries, and does pass through the ascending cava into the right auricle and ventricle, and thence into the lungs, where it undergoes analogous but more perfect changes to those effected in the placenta, and is distributed to the body generally. By degrees, the foramen ovale closes, and the ductus arteriosus, ductus venosus, and umbilical arteries are obliterated; the adult circulation is then established. Digestion takes place on the reception of food, the liver becomes more active, and the usual excretions of the kidneys and intestinal canal occur.

Before birth, the only sense in exercise was that of touch, but immediately afterwards those of sight and hearing are called into activity, and at a later period those of taste and smell. A considerable time elapses before the sensuous impressions are correctly appreciated, yet every day adds its quota of instruction, and hourly experience at length produces accuracy. The brain, which was perfectly quiescent during gestation, is now the focus for the impressions produced upon the senses, and the seat of such intellectual operations as can take place at so early a period; and the nervous system generally is the centre to which all organic operations are referrible.

In conclusion, I shall briefly notice the so-called *laws of development*.

The first of these is the law of *unity of organization*, in virtue of which "the progressive phases of the embryo correspond to the abiding forms, which are preserved in the total organism of animated nature as typical of its gradative evolution; and that as the embryo of each higher animal passes rapidly through the forms of the animals inferior to it, in order to attain its maturity and specific rank of being, that of man is transitively the compendium of all; not, indeed, without a difference, since in each instance the changing form of the embryo bears the impress of the transitional and incomplete character, while it ever preserves the promise and prophecy of the being into which it is to be finally evolved." This law of transitive development, so eloquently described by Mr. Green in the extract I have quoted from his Hunterian oration, has been established by the researches of Wolff, Otto, Meckel, and other German physiologists; but it is only just to state that the idea was familiar to our great natural philosopher, John Hunter, who remarks, "If we were capable of following the progress of increase of the number of the parts of the most perfect animal, as they are formed in succession from the very first, to its state of full perfection, we should probably be able to compare it with some one of the incomplete animals themselves, of every order of animals in the creation, being at no stage different from some of those inferior orders; or, in other words, if we were to take a series of animals from the more imperfect to the perfect, we should probably find an imperfect animal corresponding with some stage of the more perfect." In accordance with this law, we find the fœtal nervous system at the earliest period resembling that of the annelides, then that of the invertebrata, and afterwards that of fishes, reptiles, birds, &c. The same may be said of other organs, and we have already given an example in the case of the uterus.

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* Dublin Quarterly Journal, May, 1855.

More striking illustrations may be derived from certain abnormal deviations, of which Mr. Green remarks, "and it did not escape Hunter, as a consequence of the same law, that congenital defects, hitherto comprehended under the vague designation of monstrosity, are to be explained by the development of the embryo being interrupted at some early stage of its regular evolution, and that the defective form which is the result, is analogous to the form and structure of an inferior class." Thus we have the law exhibited in the successive transitions of the fœtus until its arrival at its perfect state; and, if possible, more strikingly illustrated by those exceptions where it fails to attain this perfection.

The other law I shall notice has also received its most impressive elucidation from certain exceptions: it is called the *law of symmetry*, conjugation, or affinity, founded upon the general observation that all formations proceed from the circumference to the centre. According to M. Serres, the body generally, and each organ, whether single or double at birth, is originally divisible into two parts, that each half grows towards the mesial line, where it meets its opposite and is joined to it, as we saw in the case of the dorsal and ventral laminæ. If the law of progression be equally observed by both halves, the organ resulting from their union will be perfect; if the growth be unequal, deficient, or excessive, the result will be deformity by defect or excess. Again, connected with this law of symmetry, and perhaps causing its deviations, is the fact, that development of each part of the body is to a certain extent dependent upon its vascular supply; if this be deficient or in excess, so most probably will be the other.

We are now able to classify to a certain extent the deviations from the normal formation of the fœtus—viz., into those whose deformity results from an arrest of the transitive development, those arising from irregularity of symmetrical growth, and those dependent upon vascular irregularities. Others still remain, however, the larger class probably depending upon diseased action in the organs or structures of the fœtus or of its dependencies, and some of which it is very difficult to explain at present.

CHAPTER IV.

SIGNS OF PREGNANCY.

Having now minutely described the process of utero-gestation, let us examine the signs and symptoms to which it gives rise, and by which it may be detected. I need say but little as to the importance of such an inquiry, or of the responsibility which is incurred by a physician, when his opinion is demanded. The honour, and therefore the happiness of a female, may depend upon his decision; the peace of families may rest upon it; and the inheritance of property be controlled by it. The limits of this work oblige me to treat the question rather as a physiological than a medico-legal one; but although much is omitted which might be available in the latter point of view, all that is adduced applies equally to both. In all such cases, the reader is to remember that he may not merely be requested to investigate a case of doubtful pregnancy, where no shame is involved, but that he may be consulted in cases where pregnancy is concealed by unmarried women, or by married women under certain circumstances, to avoid disgrace; and on the other hand, where it is pretended, in order to secure an inheritance, to extort money, or to delay punishment. In considering each "sign," I shall endeavour to state its value as *evidence*, as well as to describe its characters as a *symptom*.

The signs of pregnancy have been variously classified, and no doubt in a formal treatise a scientific classification is necessary; but in a brief summary like the present, it appears to me that it will be more useful to take them rather in the order of time in which they are developed; by which means the student will find grouped together the early evidences of pregnancy, and again, those indicative of more advanced gestation.

The *general condition* of a pregnant woman is plethoric; the pulse is quicker and fuller, the quantity of circulating fluid is said to be augmented, and its quality altered by the increase of fibrine, judging from the prevalence of the buffy coat in blood taken under such circumstances.

Well-marked reflex-irritations are excited in distant organs, which often amount to distress, and the nervous system may suffer both primarily and secondarily. Variations in temper and disposition are of frequent occurrence, as well as caprices of taste. The chylopoietic viscera are often deranged, and the secretion from the kidneys altered. The skin may change its colour, and become sallow or discoloured in patches, though in some cases it becomes more florid, with occasional eruptions on the face. Some women become fat during pregnancy, others lose flesh. But in some particulars, the deviations from the ordinary state are more remarkable, and constitute the special signs upon which our diagnosis must be grounded: these we shall now notice, premising that the diagnosis of early pregnancy is no easy task, but one which requires great care and discrimination.

I. CESSATION OF MENSTRUATION.—One of the first circumstances which leads a female to suspect that she is pregnant, is the non-appearance of the catamenia at the proper time, and if at the second period they are still absent, it is deemed conclusive, or nearly so.

No doubt this is one of the most unvarying, as it is one of the earliest, results of pregnancy. But, strictly speaking, it is not conclusive, inasmuch as the discharge may recur for some months after conception, or even monthly during the whole period of utero-gestation. Such cases have been recorded by Mauriceau, Puzos, Desormeaux, Johnson, Frank, Dewees, Kennedy, Montgomery, &c., and several such have occurred to myself.*

Again, conception may take place previous to menstruation, or immediately after ceasing to give suck, before it has had time to occur. Nay, some cases are on record where women menstruated only during gestation.

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* For an explanation of this occurrence, the reader may consult a paper by Dr. J. Matthews Duncan in the Ed. Monthly Journal, April, 185

Lastly, the catamenia may be arrested by disease of various kinds, and it is even possible for pregnancy to occur in such cases.

If, then, menstruation may be suspended by other causes on the one hand, and may continue, notwithstanding pregnancy, on the other hand, it is evident, that by itself, the cessation of menstruation is not a *proof* of conception, although it is of considerable value (inversely as to the frequency of the exceptions) as evidence, especially combined with other signs. I may add, that in cases of concealed pregnancy the woman sometimes stains her linen with blood, in order to simulate this discharge.

II. Morning Sickness.—The intimate sympathy between the uterus and stomach, is shown by the irritability of the latter soon after conception. Most women suffer more or less from nausea and vomiting, especially on rising in the morning; hence it is termed "the morning sickness." I think there is reason to believe that it depends upon some irritable condition of the cervix uteri. The irritability may commence immediately after conception, as in two cases mentioned by Dr. Montgomery; but more generally it sets in about the fifth or sixth week, and ceases soon after the third month. The daily attack lasts but a short time, from ten minutes to an hour, after which the patient completely recovers, and is able to take food.

As an evidence of pregnancy, its occurrence at the regular time and in the usual manner, is of great value when combined with other symptoms, but the exceptions and irregularities are sufficiently frequent to render it more doubtful if taken alone; for it may be altogether absent, and yet the patient be pregnant, or if present, it may occur at unusual times, or with extraordinary violence; with some women it occurs during the night only, with others it lasts during the entire day, and may continue throughout the period of gestation. On the other hand, it may be present as morning sickness, from various causes, and especially from disease of the cervix uteri, and yet the patient not be pregnant.

Dr. Ramsbotham remarks, that when vomiting "is entirely absent, utero-gestation does not proceed with its usual regularity and activity;" and so far my experience agrees with his, that irregularities in this particular are frequently followed by deviations in the other symptoms of pregnancy.

III. Salivation.—The reflex-irritation caused by pregnancy may affect the salivary glands, and induce salivation, although it is not of very frequent occurrence. It is enumerated by Hippocrates and the earlier writers as one of the signs of pregnancy; but recent authorities consider it of less value. Cases, however, are mentioned by Dewees, Montgomery, and others. Several such have occurred to myself, in which it commenced at an early period, was very profuse, but unaccompanied by swelling of the glands or tenderness; and it ceased spontaneously, in one case, about the fourth month, in another about the fifth, and in a third about the eighth. As Dr. Montgomery has observed, it is "easily distinguished from the ptyalism induced by mercury, by the absence of sponginess and soreness of the gums, and of the peculiar fœtor, and by the presence of pregnancy."

IV. MAMMARY SYMPATHIES.—About two months after conception the attention of the female is attracted to the state of the breasts. She feels an uneasy sensation of fulness, with throbbing and tingling pain in their substance and at the nipples. They increase in size and firmness, and have a peculiar knotty, glandular feel; the areola darkens, and after some time, a milky fluid is secreted.

But it must be recollected that the breasts may enlarge from other causes; this happens with some women at each menstrual period: when the catamenia are suspended, or after they cease; and at such time a milky fluid may be secreted. Distension of the uterus from hydatids or other causes, is accompanied by a change in the breasts. On the other hand, Gardien and Mahon have remarked, that when menstruation takes place during the early months of gestation, the swelling and pain of the breasts are absent; and Dr. Montgomery mentions a case in which no alteration took place until after delivery, in consequence of the delicate state of the patient's health.

Increased experience has led me to attach great value to the feeling of substance in the breast. I have found it earlier than changes in the areola, and even when they were absent. And though in a slight degree it may be met with during menstruation, it is temporary, and by no means so well marked.

In the virgin state the *colour* of the *nipple* and *areola* differs comparatively little from that of the surrounding skin; it is generally a few shades deeper, but sometimes scarcely that.

But after conception a great change is observed in most women, though less marked in those of very light complexions. The first alteration perceptible is "a soft and moist state of the integument, which appears raised and in a state of turgescence, giving one the idea, that if touched by the point of the finger, it would be found emphysematous; this state appears, however, to be caused by infiltration of the subjacent cellular tissue, which, together with its altered colour, gives us the idea of a part in which there is going forward a greater degree of vital action than is in operation around it, and we not unfrequently find that the little glandular follicles, or tubercles, as they are called by Morgagni, are bedewed with a secretion sufficient to damp and colour the woman's inner dress." The above is an extract from Dr. Montgomery's work, to which, and to the plates accompanying it, I beg to refer the reader. This first change in the areola takes place at an early period; Dr. Montgomery states that he has recognised it at the end of the second month. Dr. Houghton of Dudley has mentioned to me the particulars of a case in which he observed it as early as the fourteenth or fifteenth day, and the circumstances leave no doubt that the lady could not have been more advanced in pregnancy. "During the progress of the next two months, the changes in the areola are in general perfected, or nearly so; and then it presents the following characters: a circle round the nipple, whose colour varies in intensity according to the particular complexion of the individual, being usually much darker in persons with black hair, dark eyes, and sallow skin, than in those of fair hair, light-coloured eyes, and delicate complexion. The extent of the circle varies in diameter from an inch to an inch and a half, and increases in most persons as pregnancy advances, as does also the depth of colour." "In the centre of the coloured circle, the nipple is observed partaking of the altered colour of the part, and appearing turgid and prominent, while the surface of the areola, especially that part of it which lies more immediately around the base of the nipple, is studded over and rendered unequal by the prominence of the glandular follicles, which, varying in number from twelve to twenty, project from the sixteenth to the eighth of an inch; and lastly, the integument covering the part appears turgescent, softer and more moist, than that which surrounds it, while on both there are to be observed at this period, especially in women of dark hair and eyes, numerous round spots or small mottled patches of a whitish colour, scattered over the outer part of the areola, and for about an inch or more all around, presenting an appearance as if the colour had been discharged by a shower of drops falling on the part." Dr. Montgomery fixes the time of this peculiar appearance at about the fifth month, at which time the breasts have become full and firm, with large veins ramifying on their surface. After the sixth month, a number of silvery streaks like cracks may be observed, the result of over-distension.

To these well-marked changes in the areola and nipple there are many exceptions; the colour, which is in general the most prominent alteration, may not deepen so decidedly; and many cases of women of light complexion occur, in whom it scarcely differs from the surrounding skin. Besides, as Dr. Ingleby has well remarked, "when the colour of the integument around the nipple has been once modified by pregnancy and nursing, it is no longer, I think, a conclusive criterion." Again, in other cases the sebaceous glands are but slightly developed; but I have almost invariably observed the puffy state of the areola in first pregnancies. If the fœtus die, the changes are arrested, and gradually decline.

On the other hand, something resembling the deepened colour of the areola, as well as enlargement of the mammary gland, is said to be present, when the uterus is distended from other causes; and I have repeatedly seen the follicles developed in patients neither pregnant nor nursing. Upon the whole, however, the changes in the breasts and nipples are certainly the most unequivocal of all the early signs of pregnancy.

I am not aware that any description has been given of the change which takes place in the nipple when childbearing ceases, and yet it has struck me as being practically important. The breast, as all know, becomes flaccid and baggy, but so it does after weaning in women who have had three or four children; when childbearing is over the gland atrophies, so that it is at length scarcely to be felt. The areola becomes paler, and the sebaceous glands disappear, but a peculiar change takes place in the nipple: it diminishes in size, loses its prominence and the peculiar granular appearance on its end; it becomes small and smooth, its appearance something like a smooth wart. I am satisfied that it never undergoes this change between pregnancies, nor until childbearing ceases. Moreover I think, though it will require more observations to be sure, that this change takes place immediately on the cessation of this function—certainly before the cessation of menstruation. If this be true, it may be of great use to us in coming to a conclusion in some of those doubtful cases where pregnancy is suspected at an advanced age, in consequence of the catamenia being absent for two or three periods, and when no special enlargement of the breasts has taken place.

Milk in the breasts, although a popular evidence much relied upon, can scarcely be considered of any value at all. It is true, we do often find it at an early period, and generally at a later; yet it occurs so frequently without pregnancy, that no certain conclusions can be drawn from it. For instance, Baudelocque mentions the case of a girl of eight years old, who milked her breasts in presence of the Royal Academy of Surgery, October 16th, 1783, and Belloc another; in both the secretion was apparently the result of the application of a child to the breasts. A similar case, but in a woman, is related by Mr. Semple.* Milk is also occasionally secreted at each return of the catamenia, and may remain very long after weaning. Foderè mentions that he has frequently known it secreted at the final cessation of menstruation.

From what has preceded, the student will have gathered that the diagnosis of pregnancy in the early months must be more or less doubtful. No single sign can be relied on as conclusive; it is only when two or three are present, and occur in proper sequence, that we can feel pretty certain. For example: if a patient miss one or two periods, we may have grounds for suspicion, and these will be strengthened if morning sickness occur in the second month; but if to these be added enlargement and increased firmness of the breasts and darkening of the areola, the case will be in the highest degree probable. In many cases, too, we may derive assistance from the character and circumstances of our patient. In doubtful cases, it is much better to avoid giving a positive diagnosis until time shall have developed more characteristic signs. It is not, however, until the latter half of gestation that we obtain positive evidence, which can neither be simulated nor evaded. This we shall now consider.

Enlargement of the Abdomen.—The gradual distension of the uterus has already been described as tolerably equable, enabling us to estimate the period of pregnancy by the height to which it has attained in the abdomen. During the early months, although it be not perceptible above the pubis, yet the abdomen increases by degrees, owing to the intestines being pushed up from the pelvis. This enlargement, however, is variable, owing to the distension of the intestines by gas or fæcal accumulation. In some cases, the abdomen even becomes flatter at first, from the sinking of the uterus in the pelvis; but it soon increases again, and by the end of the third month it is visibly but equably enlarged. During the fourth month, the womb ascends above the symphysis pubis, and may be felt as a rounded tumour, which goes on augmenting till it occupies the whole abdomen. When it reaches the umbilicus, it pushes it forward, so that in the sixth and seventh months it is about level with the surrounding skin, and afterwards it projects beyond it in most women. During the process of distension, a dark line ascending upwards from the pubis becomes visible, and in some cases cracks (linea albicantes) appear under the skin, such as are commonly observed after delivery; but neither of these signs are proofs of pregnancy; they merely prove that the abdominal walls are, or have been, much distended. I have seen both in men.

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* North of England Med. and Surg. Journal, vol. i. p. 230.

The *feel* of the abdomen distended by the uterus is very different from the impression it gives when the distension is caused by fluid, flatus, &c. The uterine tumour is firm, hard, elastic, and defined, preserving its form in all positions of the body, though more remarkably when the patient is upright; whereas in ascites the defined tumour is wanting, the fluid obeys the law of gravitation, and the abdomen has not the same firm, elastic feel. The best mode of examining the uterine tumour, is to make the patient first stand up, and then lie down; this will demonstrate the form of the womb better than keeping in one position; and after lying for some time, the uterine parietes become relaxed and less firm. Percussion will distinguish between pregnancy and tympanites.

Nevertheless cases do occur which are very embarrassing; for the uterus itself may be distended by air, fluid, or hydatids, and then the form of the uterus and abdomen will be the same as in pregnancy. In such cases, our guide must be the history of the case, and further investigations into the contents of the uterus. I have already described the changes which take place in the cervix.

QUICKENING.—This term is popularly applied to the mother's perception of the first movements of the fœtus, under the erroneous belief that it was its first movement, as it then became alive or quick. We know that the fœtus is alive from the moment of conception, and have little doubt but that movements take place at a much earlier period. By modern writers, then, the term is applied to the first perception of movement on the part of the mother, which generally occurs about four or four and a half months after conception, though some feel it earlier, and others not till afterwards. Dr. Montgomery observes: "Experience has shown that it happens from the tenth to the twenty-fifth week; but according to my experience, the greatest number of instances will be found to occur between the end of the twelfth and sixteenth week after conception; or, adopting another mode of calculation, between the fourteenth and eighteenth week after the last menstruation." Out of one hundred cases, Rœderer found that eighty quickened at the fourth month, and of the remaining twenty, some at the third and some at the fifth.

The sensation is at first like a feeble pulsation; and though so slight, is often accompanied by sickness of stomach and faintishness, or even complete syncope. By degrees it becomes stronger and more frequent, until the movements of the different extremities are distinguishable. Authors are not agreed as to the explanation of quickening, or why the movements are felt at the fourth month or thereabouts, and not earlier. I think, upon the whole, that the most probable explanation is the one which the late Dr. Fletcher, of Edinburgh, used to give in his lectures. "The movements of the fœtus while the uterus is in the cavity of the pelvis are not perceived, because the uterus is not supplied with nerves of sensation, and it is surrounded by parts similarly deficient; but when it emerges from the pelvis, it comes in contact anteriorly with the abdominal parietes, which are liberally supplied with sensitive nerves, and which, by contiguity of substance, feel the movements, and thus the woman becomes conscious of them. This view is strengthened by the fact, of which I have repeatedly been assured, that the movements, unless when violent, are felt in front only."

Its value as a sign of pregnancy is somewhat impaired by the interval which frequently intervenes between the first faint sensations and their repetition; by the late period at which they are felt in some cases; and, in a medico-legal point of view, by our being dependent upon the evidence of the patient herself: and the patient may be deceived by flatus in the intestines. On the other hand, cases occur where no sensation is perceived by the mother. "Of this fact," says Dr. Montgomery, "the writer can speak with certainty, having now in several instances, by applying his hand to the abdomen, distinctly felt the motions of the fœtus in utero, while the mother had no perception of them." In a case lately under my care the movements of the child were exactly similar, and scarcely more felt by the patient at the termination of pregnancy than at quickening, and yet both mother and child were strong and healthy.

The *movements of the fœtus* may be felt by the practitioner some little time after quickening, by placing the hand, especially if it be cold, upon the abdomen; and the impression will of course be in proportion to the vigour of the motions. At an advanced period it would not be easy to mistake them; but we may be deceived at an earlier period. Dr. Blundell relates a case of a woman who possessed the power of simulating these movements by the action of the abdominal muscles.

Dr. Tyler Smith describes two abdominal movements in the latter month of pregnancy; one traversing irregularly over the abdomen, giving a feeling of ridges or prominences to the hand, and the other like a shock or impulse; the former he regards as due to the peristaltic movements of the uterus, and the latter only to the fœtus, and I have no doubt that he is right, and that this is the explanation of the movements felt by women carrying a dead child. I am happy to express my obligations to his work, which I regard as one of the most important and ingenious that has appeared for many years, both as expressing more clearly the "idea" of uterine and ovarian physiology, and also as giving it for the first time the unity of a system.

BALLOTTEMENT.—A vaginal examination will enable us to ascertain not merely the state of the cervix, but also to decide upon the presence of a fœtus, by repercussion, or *ballottement,* as it is termed by the French. The patient should be in the upright position; or if she be in bed, her shoulders should be raised; the operator must then introduce his forefinger, and place it upon the cervix uteri, whilst the other hand is employed to keep the uterine tumour steady, then suddenly but slightly jerking upwards the point of his finger, he will feel a sensation of something having receded from it, and which he will perceive to fall again on the point of his finger in a moment or two. The jerk of the finger upon the head of the fœtus causes it to float upwards a little in the liquor amnii, and its own weight makes it descend. Dr. Montgomery justly remarks that "should this be distinctly felt, it is proof positive of a fœtus in utero, there being no other condition or disease of the organ in which a solid body can be felt in this way floating in the cavity." Of course it proves nothing as to the life of the child. The period when this test is most available is during the fifth and sixth months.

AUSCULTATION.—M. Mayor, of Geneva, first applied, in 1818, auscultation to the diagnosis of pregnancy; he was followed, in 1821, by M. Lejumeau de Kergaradec, and, since his time, the investigation has been pursued with zeal and intelligence by Haus, Hohl, Kennedy, Montgomery, Naegelè, jun., Depaul,* &c. M. Mayor observed only the sounds of the fœtal heart, but M. Kergaradec detected not only this double sound, but another single, whirring sound, which he called "*bruit placentaire,*" because he believed it to be situated in the placenta. To these two sounds Dr. E. Kennedy has added a third, which is heard only occasionally—the pulsation in the funis. Each of these deserves a separate investigation.

As to the mode of making the examination, it may be effected with the naked ear applied to the abdomen, or by the stethoscope; the latter is preferable, as it enables us to define and limit the sound, and in most instances it is more convenient. The patient, if possible, should be placed on her back in bed, with the head raised, and the abdomen covered only by the night-dress. If there be any doubt, it will be necessary to remove the night-dress and apply the stethoscope immediately to the abdomen. I have repeatedly succeeded in detecting the fœtal heart thus, when the sounds were too faint to be heard through any covering. In this way we can obtain access to all parts of the uterine tumour, except posteriorly, and by turning the patient to one side or the other, we can easily examine the lateral portions. The auscultator should place himself in the easiest posture possible, especially avoiding too dependent a position of the head, in which case he would be apt to mistake the throbbing of his own arteries for sounds communicated from the patient. The stethoscope should be placed lightly upon the abdomen, and the pressure be varied, in order to ascertain whether the sounds are in any degree modified by it.

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* Traité Théorique et Pratique de l'Auscultation Obstetricale. Paris, 1847.

The UTERINE SOUFFLE, or *bruit placentaire*, is a single intermitting whirring sound, heard over a certain extent of the uterine surface. It has been compared to the sound of a pair of bellows, to that made by gently blowing over the mouth of a bottle, and to that heard when a shell is applied to the ear, &c. Perhaps the best comparison is with the "*bruit de soufflet*" of the heart, which is doubtless sufficiently familiar to all. Dr. E. Kennedy remarks, that it assumes all the variations of the latter sound—viz., the rasping or sawing sound, the musical or hissing sound, a sound resembling the cooing of a dove, and a drone resembling that of a bagpipe, accompanying the sound, yet without interfering with it. It is stated by Hohl and others to be limited to the situation of the placenta, and so it is generally; but in many cases it extends to some distance, and in others, according to Naegelè, it may be heard in almost any part of the uterus: he further states, that it may constantly be heard at the lower part of the uterus, by applying the stethoscope near Poupart's ligament. I cannot say that I have been able to verify the latter statement, but I have found it very possible to produce a souffle in that situation by a little extra pressure of the stethoscope, but which is heard less extensively than the placental souffle.

The period when it first becomes audible is about the fourth month, according to Montgomery, Hohl, and Naegelè; Dr. E. Kennedy states that he has succeeded in detecting it as early as the tenth week; and, on the other hand, it cannot be heard in some cases until the fifth month. It may, however, always be distinguished before the pulsations of the fœtal heart; and even when the fœtus perishes, it continues for some time afterwards, but, according to Dr. Eastlake,* in a modified manner—"a muffled sawing noise"—which he thinks conclusive as to the death of the fœtus.

It is feeble when first heard, but increases in intensity and strength; the intensity, however, is subject to some variation. It is synchronous with the mother's pulse, and subject to its varieties, but without impulse. During labour its intensity varies; in the upper part of the uterus it is frequently inaudible during a pain; after delivery it ceases entirely, though not always instantly.

M. Kergaradec, as I have already said, placed the seat of this sound in the placenta; more recent investigations, however, have decided that it is situated in the uterus. M. Ulsamer and Dr. E. Kennedy conceive it to result from the difference between the calibre of the arteries supplying the uterus and the uterine sinuses; that the expanding current of blood rushing from an artery into a larger sinus gives rise to the sound, just as the passage of blood through a constricted valve of the heart or aorta does to the bruit de soufflet. M. Depaul and M. Caseaux also place its seat in the uterus, and the latter authority considers that it is in part, at least, owing to a "serous polyhæmia," as advocated by M. Beau.† Other explanations have been given, but all are agreed now that its seat is in the uterus, and not in the placenta; and most, I believe, that it indicates the position of the latter organ.

As a test of pregnancy, its *positive* value (that is, its being audible) is very great, though not quite conclusive, as it is heard sometimes in cases of disease, of which I had instances under my own care, and may occasionally be produced by too great pressure of the stethoscope upon an artery. Neither does it prove that the fœtus is alive, in cases of pregnancy, as it is observed to persist for a short time after the death of the child; it is heard also in some cases of blighted ova which have degenerated into moles, and in cases of hydatids.

On the other hand, its *negative* evidence (our not being able to detect it) is of much less value, as we may not be able to hear the sound although the patient be pregnant, probably from the placenta being attached posteriorly.

In 212 cases, M. Jacquemier found it present in 80 cases, and absent in 132. In 600 cases M. Naegelè heard it 238 times on the left, 141 times on the right side, and in 20 cases it was absent.

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* Obstetric Trans., vol. vi. p. 238.

† Archiv. Gén. de Méd., 1850.

Pulsation of the Fœtal Heart.—Very different from the uterine souffle is the sound which attracted the attention of M. Mayor, the pulsation of the fœtal heart. It consists of a rapid succession of short, regular, double pulsations, differing from those of the adult heart in rhythm and frequency. The sound is something like the muffled ticking of a watch, or, as Naegelè remarks, like the pulsations of the heart of a new-born child, but with different rhythm. The frequency is about double those of the adult, or from 120 to 140 pulsations in a minute—*i.e.*, 240 to 286 audible sounds; but in counting, we reckon the second sound only, as it would be impossible to count both, and the second is the loudest. M. Naegelè, jun., found that, in 600 cases, the average frequency was 130 (*i.e.*, 260 sounds) strokes in a minute. M. Henig gives 138, 142, 155, and 141 as the average at bi-monthly periods; and M. Huter gives 132 as the mean. I have already described the peculiarities of the double sound in the fœtal heart, with the change of rhythm which takes place at birth, and which I need not here repeat.

The variations in strength and rhythm of the pulsations of the fœtal heart are very numerous, and not easily explained; no doubt many are caused by changes in the condition of the fœtus itself, and others by impressions received from the mother; for although the fœtal circulation is independent of that of the parent, yet there is so intimate a sympathy, that disturbances in the maternal system are communicated to that of the fœtus, some (in case of sudden shocks) immediately, and others (in case of disease) more tardily.

The situation in which the fœtal heart is heard most distinctly, is about the middle, or inferior abdominal region, more frequently on the left than on the right side. "The extent of surface," says M. Naegelè, jun.,* "over which the beating of the heart is heard, cannot be accurately defined in inches and lines, but it is certainly audible through a larger space than most observers have represented. Its sounds reached beyond the linea alba towards the other side, in one hundred and eighty-five of three hundred and seventy cases, in which the position of the fœtus with its back to the left side of the mother was distinctly ascertained by the ear, and afterwards verified by the result of the labour; in forty-six, they were audible over nearly the whole abdomen; while in one hundred and thirty-seven, they were confined to the left side, and did not reach the mesial line. The heart's sounds were audible beyond the mesial line, only in forty-five of one hundred and eighty-five instances, in which the back of the fœtus was directed to the right side; one hundred and fourteen times they were distinguishable on the right side only; but in twenty-six they extended over the whole abdomen. In all these instances in which the heart's sounds were not limited to one lateral half of the abdomen, their greater intensity at one part indicated the situation of the back, and consequently the position of the fœtus."

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* On Auscultation, translated by Dr. West, p. 41.

So far as the second sound of the fœtal heart is concerned, my experience agrees with that of M. Naegelè, but I have found that the first sound becomes inaudible at a very moderate distance from the situation of the fœtal heart.

The earliest period at which the pulsations can ordinarily be detected, is the middle of the fourth month, or the beginning of the fifth. Dr. E. Kennedy has heard them in a few instances before the expiration of the fourth month. Dr. Montgomery names the end of the fifth month. The earliest period mentioned by Naegelè is the eighteenth week, in thirty out of fifty patients who were examined before the middle of pregnancy. In some cases they did not become audible before the fifth month. It is easy to conceive that various circumstances may impede the transmission of the sound, and so alter the time at which it would otherwise be first heard, as, for example, excess of liquor amnii, thickness of the abdominal parietes, or feebleness of the fœtus.

When the pulsation of the fœtal heart is heard, it is proof positive of pregnancy, equally remote from imitation or evasion. The only circumstances at all likely to embarrass us for a moment, are the sounds of the maternal heart, which may sometimes be heard; the sound of the contraction of the abdominal muscles, or of the uterine arteries; but the greater rapidity, the rhythm, and the clearer, though feebler, sound of the fœtal pulsations will distinguish them with facility.

On the other hand, the pulsations being inaudible is not conclusive proof that the patient is not pregnant, as the child may have died, or, as in some rare cases, they may be inaudible for a time, though the fœtus be living. I know this to be the fact, though I cannot explain it. M. Depaul mentions that in 906 cases it was only absent in eight cases.

In some rare cases of pregnancy the pulsations of the aorta are heard, or rather felt, even beyond the fifth month; but why they are thus transmitted I cannot say. As a general rule, if they are distinctly heard, it is good evidence that the patient is either not pregnant, or that the uterus has not risen up out of the pelvis.

PULSATION OF THE UMBILICAL CORD, or *funic souffle.*—If the position of the funis be favourable, as, for instance, if it be twisted round the neck, body, or limbs of the fœtus, or in any way placed between the fœtus and the anterior or lateral parietes of the uterus, it is quite possible, as Dr. E. Kennedy has shown, to hear the pulsation of its arteries corresponding to the fœtal heart's action. Both Haus and Hohl have denied this, but without just reason, in my opinion; for Dr. E. Kennedy states that "in some cases where the parietes of the uterus and abdomen were extremely thin, he has been able to distinguish the funis by the touch externally, and has felt it rolling under his finger, and then applying the stethoscope, its pulsations have been discoverable, remarkably strong." Professor Naegelè, jun., agrees with Dr. E. Kennedy as to the seat of the pulsation, and attributes it to the tortuosity of the arteries, and to the dilatations observed in them. Frankenhäuser thinks it is produced by compression of the funis. He has detected it in about eight per cent. of his cases, and more commonly when the breech presents.* Occasionally the sound is rather a souffle than a pulsation, but fainter than the uterine souffle, and distinguished from it by its being synchronous with the pulsations of the fœtal, and not the maternal, heart. Dr. E. Kennedy found that he could produce the souffle by pressing slightly upon the cord with the edge of the stethoscope.

We have now examined the principal signs developed during the latter half of pregnancy—to wit, enlargement of the abdomen, quickening, the motions of the child, ballottement, and the results of auscultation; and we find that whilst all are valuable, there is a degree of uncertainty attached to the first three which calls for a very careful estimate on our part: that the *positive* evidence of the latter modes of investigation is conclusive, but that the *negative* evidence, or absence of the usual results, is not proof that the patient is not pregnant. So that, as was before observed, we ought rather to depend upon the coincidence of two or more of the signs of pregnancy, than attempt a diagnosis from any one alone: the only sign indeed which can be regarded as proving that the woman is pregnant of a living child, is the pulsation of the fœtal heart.

KIESTEINE.—There are two other signs which I have deferred noticing until now, because they require more research to entitle them to a place among the recognised evidences of gestation, and it seemed better that the student's attention should rather be directed to those considered valid, than embarrassed by doubtful ones. The first of these tests is derived from the urine. M. Nauche was the first who accurately described the change which takes place in the urine of pregnant women. He found that "by allowing the urine to stand for some time, in thirty or forty hours a deposit takes place of white, flaky, pulverulent, grumous matter, being the caseum, or peculiar principle of the milk formed in the breasts during gestation." This deposit has lately received the name of *Kiesteine.* M. Eguisier has published the result of his researches on the subject.* He states that "the urine of a pregnant woman, examined in the morning, is generally of a pale yellow colour, and slightly milky; it first reddens, and then turns blue '*papier tournesol,*' as ordinary urine. Exposed to the contact of air, a cloudiness is observed from the first day, resembling fine wool; from the first day, also, a white matter is deposited. These phenomena are not, however, constant. From the second to the sixth day, small opaque bodies are seen rising from the bottom to the surface of the fluid, and then collecting together until they form a layer, covering the whole surface: this is kiesteine. It is sufficiently consistent to be raised from off the fluid. It is whitish, opaline, slightly granular, and resembles much the layer of fat which swims on the surface of fat broth when cool. Examined by the microscope, it appears a gelatinous mass of indeterminate form. When it is old, cubical crystals are sometimes detected." "It persists thus for three or four days; the urine then becomes troubled; small portions are detached from its surface, and sink to the bottom, until the layer is entirely broken up. Kiesteine appears to exist in the urine from the first month until the period of delivery." Dr. Montgomery seems to think this appearance constant, when the deep colour and turbid condition of the urine permit of observation.

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* Monats. für Geb., May, 1860.

Dr. Golding Bird has published a series of experiments on this subject,† which confirm the value of this test. The pellicle formed in the urine of twenty-seven out of thirty pregnant women, and it was found only in two instances, out of a number, in the urine of unmarried women. I shall quote his conclusions:—"1. That certain organic matters, closely resembling, if not identical with, caseous matter, mixed with abundance of the earthy phosphates in a crystallized state, are eliminated from the blood during pregnancy; and if not otherwise removed, or taken up, are finally thrown out of the system by the kidneys. 2. That certain accidental circumstances, especially connected with those morbid actions in which the kidney is called upon to perform a compensating function for the skin, as indicated by the abundance of azotized matter, in the form of amorphous lithate of ammonia, in the urine, interfere temporarily with the development of caseous matter, as they do in checking the cutaneous and other secretions. 3. That, taken in connexion with other symptoms, as the formation of a dark areola round the nipple, and cessation of menstruation and abdominal enlargement, the formation of a caseous pellicle in the urine affords a very valuable corroborative indication of the existence of pregnancy."

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* Lancette Française, Feb. 1839.

† Guy's Hosp. Reports, No. 10.

This subject has been investigated by the late Dr. E. K. Kane, in the Philadelphia Hospital, and he has arrived at the following conclusions:—1. That kiesteine is *not peculiar* to pregnancy, but may occur whenever the lacteal elements are secreted without a free discharge at the mammæ. 2. That though sometimes obscurely developed, and occasionally simulated by pellicles, it is generally distinguishable from all others. 3. That when pregnancy is possible, the exhibition of a clearly defined kiesteine pellicle is one of the least equivocal proofs of that condition: and, 4. That when this pellicle is not found in the more advanced stages of supposed pregnancy, the probabilities, if the female be otherwise healthy, are as 20 to 1 (80 to 4) that the prognosis is incorrect.* Dr. Braxton Hicks states that the addition of two teaspoonfuls of rennet to three ounces of the urine will hasten the appearance and increase the quantity of the kiesteine.†

JACQUEMIER'S TEST.—This consists in a violet colour of the mucous membrane of the vagina and vulva, dependent probably upon pressure above. M. Parent-Duchatelet confirms the result of M. Jacquemier's observations, which he states were made upon a large number of pregnant women, and that the change of colour was never absent. I had lately an opportunity of minutely examining a well-marked case, and found that the violet colour was caused by a great number of minute veins in a varicose condition. This, however, is denied by Dr. Wistrand, as he has not found the livid colour following the course of the veins, but extending uniformly over the entire mucous membrane. He regards it as owing to the hyperæmic congestion, produced by compression of the utero-pelvic veins, and that it may be perceived towards the close of the second month, becoming more evident during the third and fourth.‡ Malvani, Heiberg, Sperind, regard this as a never-failing sign of pregnancy, and Dr. Wistrand agrees with them. Huguier states that it is not found in any other state than pregnancy; but, on the other hand, Lange thinks that it does not occur in so marked a degree in all pregnant women, that it can certainly be distinguished from similar changes of colour from other causes.

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* American Journal of Med. Science, July, 1842.

† Lancet, vol. ii. p. 281, 1859.

‡ Dublin Quarterly Journal, vol. xiv. p. 419. *New Series.*

TWIN PREGNANCY.—The inadequacy of the signs which are commonly stated to indicate plural pregnancy, must have been felt by every accoucheur. Those upon which the greatest reliance is placed are, the disproportionate size of the abdomen compared with the period of gestation; the flattened state of the abdomen in front, with the appearance of being divided into halves; the inequality of its surface; the tumultuous movements of the fœtus; the inordinate weight and distension; and the excessive œdema of the lower extremities. No doubt many of these circumstances may be observed in twin pregnancy, yet none of them are sufficiently distinctive, while several may arise from other causes. An additional difficulty may arise from one of the fœtuses dying, and yet being retained along with the living one until the full time. M. Hohl has remarked that in twin cases the uterine souffle is heard "over a larger surface, with greater intensity and more varied tone;" but in ten twin cases observed by Naegelè, jun., no variation in this sound was observed sufficient to excite suspicion of twins.

The only sign upon which reliance can be placed, is, as Dr. E. Kennedy has pointed out, the hearing the pulsation of two fœtal hearts, equally distinct, and at a distance from each other, especially if the number of pulsations should be different in the two situations. "Usually," says Naegelè, "the beating of one heart is heard in the left or right inferior abdominal region, while that of the other is audible in the superior abdominal region of the opposite side. But it never happens, be the position of the children what it may, that the beating of the two hearts is heard on the same horizontal plane." It is the more important to bear in mind the different situations of the two hearts, because their action is often synchronous.

CHAPTER V.

DURATION OF PREGNANCY.

WHAT is the ordinary term of gestation, and what may be the deviations from it? Such are the questions to be briefly discussed in the present chapter, rather in a physiological than a medico-legal point of view; for full particulars, I refer the reader to Beck's and Taylor's Jurisprudence, and Montgomery's Essay on the subject.

The first point to be settled is the ordinary term of utero-gestation; and we are met at the outset by the difficulty of obtaining accurate data. The common mode of calculation is from a fortnight after the last menstruation; and the period so fixed is corrected by the time at which quickening occurs. In many instances this proves pretty correct; in the majority, I think, it is rather overrun; and, at any rate, the uncertainty as to the period of conception, and the variation in the time of quickening, are sufficient to render the computation no more than an approximative estimate.

Cases, however, occasionally occur, where conception follows a single coitus, and if they were sufficiently numerous, they would settle the question; but they are rare. Dr. Montgomery relates the case of a lady who went to the sea-side in June, 1831, leaving her husband in town. He visited her for the first time November 10th, and returned to town the next day. She quickened on the 29th of January, 1832, and was delivered August 17th, exactly two hundred and eighty days from the time of conception. The deductions from such cases, and from general calculation, have led to fixing the term of gestation at ten *lunar* months, or nine calendar months and one week, or forty weeks, or two hundred and eighty days, allowing for some variation either way. In an able and interesting paper,* Dr. Matthews Duncan disputes the accuracy of calculation, and maintains the truth of Harvey's statement that 275 days is the normal period of pregnancy, and that the patient will be confined after ten lunar months, on the day the catamenia would have appeared, had she not been pregnant. If we take the average of cases when the period of fruitful coitus can be ascertained, it will certainly fall short of 280 days.

But then, allowing for the uncertainty of the ordinary data, or supposing the "*point de départ*" unquestionable, are we to conclude that the actual duration of pregnancy is determinate and invariable? We know that it may be accidentally abbreviated without destroying the child, from various causes, but then this is not the natural course. In some cases, also, the natural duration may be within the limits here laid down; for example—in Dr. Girdwood's case, the period was 274 days.† Dr. Rigby gives three cases, of 260, 264, and 276. Dr. Lockwood, four cases, of 270, 272, 276, 284 days.* There is a case in the American Journal of 272 days.† Dr. Reid‡ mentions cases at 276; three of 274, one 275, 273, 271, 278, 263, 280, 264, 274, 276, 280; two of 266, 265, 272, 275, and 271 days; and in all these there appear sufficient grounds for believing in their accuracy, most of them being the result of a single coitus. In Dr. Bonar's§ interesting paper, many cases are adduced which leave us only the choice between a very short duration of pregnancy or superfœtation. On the other hand, *May it also be prolonged?* So much diversity of opinion has obtained on this point, that it is very difficult to come to a satisfactory conclusion. In the celebrated Gardiner peerage case, the most eminent accoucheurs in the country were arranged on opposite sides. Drs. Gooch, R. Blegborough, Davis, Sir C. M. Clarke, and Mr. Pennington, discrediting protracted gestation; and Drs. Granville, Conquest, Blundell, Merriman, Power, Hopkins, &c., advocating its possibility. Dr. Dewees remarks, "I have had every evidence, on this side of absolute proof, that it has been prolonged to ten calendar months, as an habitual arrangement, in at least four females—that is, each went one month longer than the calculations made, from an allowance of ten or twelve days after the cessation of the last menstrual period; and from the quickening, which was fixed at four months." Professor Desormeaux relates a case of a lady whose pregnancy lasted nine months and a fortnight. The late Professor Hamilton, of Edinburgh, declares his "solemn conviction, that he has met with at least twelve cases, in the course of practice, where there could not be the shadow of doubt of the protraction of human pregnancy beyond the ordinary period." M. Velpeau has recorded nine cases of the kind. To these authorities may be added the names of Harvey, Smellie, Zacchias, La Motte, Le Roi, Le Bas, Foderè, Capuron, Gardien, Murat, &c.

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* Edin. Med. Journal, Nov. 1856.

† Lancet, Dec. 1844.

Dr. Montgomery relates two cases in his work, one of which came under my observation; in the first the gestation continued two hundred and ninety-one days, and in the second forty-one weeks and two or three days at least. I have referred to some of the cases on record, because, the question being chiefly one of authority, positive evidence must infinitely outweigh mere negation.

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* Amer. Journal of Med. Science, Dec. 1847.

† Ibid., April, 1842.

‡ Lancet, July 20th, 1850.

§ A Critical Inquiry regarding Superfœtation. Ed. Med. Journal, Jan., 1865.

In the case of Anderson *v.* Whittaker, gestation* had lasted 283 days from the only coitus, and in Dr. Lee's case 287 days;† Dr. Beatty's‡ case was 291 days; Mr. Skey's, 293; Dr. Ashwell's, 300 days; Dr. M'Ilvain's, 293; Dr. James Reid, 287 and 293.

An additional argument has been deduced from the irregularity of the period of gestation among cattle. According to the researches of M. Tessier: out of 160 cows, 14 calved from 8 months to 8 months and 26 days; 3 at 270 days; 50 from 270 to 280 days; 68 from 280 to 290 days; 20 at 300, and 5 at 308 days; the extremes being thus 67 days apart. Of 102 mares, 3 foaled on the 311th day; 1 on the 314th; 1 on the 325th; 1 on the 326th; 1 on the 330th; 47 from 340 to 350 days; 25 from 350 to 360; 21 from 360 to 377, and one on the 394th day; the extremes being 83 days. With sows, the extremes were 15 days; and with rabbits (out of 139 cases) 7 days.

In conclusion, there is no doubt that the usual period of gestation may be *anticipated* by at least two months, without necessary injury or death to the infant; and it appears to me that the evidence we possess, as well as the weight of authority, is in favour of occasional protracted gestation; and that, to use the words of Dr. Montgomery, I "cannot imagine why gestation should be the only process, connected with reproduction, for which a total exemption from any variation in its period, should be claimed."

But on the other hand, it must be confessed that many of the cases adduced are valueless, because founded on data which are necessarily uncertain; and I should be unwilling to admit any as conclusive, occurring in persons exposed to frequent intercourse, and calculated in the ordinary manner. Dr. Clay, of Manchester, has recently published some facts tending to show that the duration of gestation depends much upon the age of the parents; that the younger the parents, the shorter the pregnancy, and *vice versâ,* and this he conceives will explain the variations that have been observed. In this calculation he takes the mean age of both parents, allowing something either way for the earlier maturity of the mother.

I may notice here a very valuable paper by Dr. McClintock on "missed labour," another term for protracted gestation, with cases. In his own case, the child was retained sixteen months after the labour should have occurred, and when some uterine effort was made. "Dr. Oldham's patient lived three months; Dr. Menzies', eight months; a case quoted by Dewees, seventeen months; Dr.

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* Lancet, July 20th, 1850.

† Med. Gazette, 1831.

‡ Dublin Med. Journal, vol. viii.

Montgomery, two years and a-half; Nebelius, over three years; Dr. Schulz, nine years; Vanderfers, eleven years; Dr. Caldwell's, over twenty years; Voigtel's, forty years; and Dr. Chester's, fifty-two years."*

CHAPTER VI.

STERILITY.

HAVING thus completed the history of conception and utero-gestation, we shall now consider certain abnormal deviations from the ordinary course of these functions; and the first in order is *sterility*, or inability to conceive.

The *causes* of this defect have been divided into functional and organic, into curable and incurable; into those which cause sterility, properly so called, and those which merely occasion impotence. Without adopting any special classification, I shall enumerate the organic and incurable cases first, and then the curable, whether functional or organic; and adding other causes, not included in either class.

The *absence of the ovaries* will render the person incurably sterile, as will also the absence of one and disease of the other, or the disorganization of both. Cases of this kind are not infrequent. Disease of the substance of the ovary may be extended to the Graafian vesicles, or they may be congenitally deficient, and so conception be prevented. "The most frequent variety of ovarian disease," says Dr. Davis, in his Obstetric Medicine, "which we may suppose calculated to produce this effect, is that of an obviously morbid enlargement of the vesiculæ Graafianæ, accompanied by a degenerated structural condition of their parietes."

The *fallopian tubes* may be congenitally deficient or imperforate, though such cases are extremely rare. Their canal may be obliterated from acute or chronic inflammation, or their fimbriated extremities may become adherent to the ovaries. Even though not imperforate, yet the canal may be filled with adventitious matter.† In all these cases, sterility is the consequence, because the contact of the spermatozoa with the ova is prevented: and notwithstanding the daring proposal of Dr. Tyler Smith, I fear it must still be classed among the incurable causes. Dr. Tilt considers subacute inflammation of the ovaries and fallopian tubes as a curable cause of sterility.*

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* Dub. Obstetrical Soc., Jan. 9th, 1861.

† Lancet, May 19th, 1849.

The *uterus* may be absent, of which numerous cases are recorded; or it may be undeveloped, which Dr. Vanoni considers a cause of sterility. If present, its cavity may be partially or wholly obliterated, as was noticed by Morgagni, Baillie, and Mott; these cases are of course incurable. The canal of the cervix may be impervious, or its mouth covered by membrane, as in many cases on record; but though sterility results so long as it continues, it is within reach of treatment, and may be cured by puncturing.

Diseases of the uterus, such as carcinoma, polypus, prolapsus, &c., are enumerated among the causes of sterility, but erroneously, I think. Madame Lachapelle, Dr. Davis, Dr. Oldham, and others, have related cases of conception and delivery, notwithstanding the existence of scirrhus and even open cancer. I have known two cases in which pregnancy and corroding ulcer co-existed.

M. Chopart mentions a case of complete prolapse, which proved no bar either to intercourse or conception. A similar case was lately related to me by Dr. Cashel of Toomavara, which was attended by himself and a medical friend. Many cases of polypus discovered during labour, or causing abortion, have been met with; several have occurred to myself.

Inversion of course involves sterility; and the same may be said when the cavity of the uterus is occupied by fluid or solid matters, and the os uteri closed, as in physometra, hydrometra, moles, &c., but these belong to the curable cases. I have seen a case in which the uterus was bound down to the left side of the pelvis in consequence of a pelvic abscess which followed her first confinement. She has since been sterile, and I think that is the cause.

The *vagina* may be absent, imperforate, or partially adherent. Some of these cases are curable by careful incision and separation, as in Dr. Physic's and M. Amussat's cases.† Again, it may be the seat of callosities, cicatrices, tumours, &c., and by them be partially closed, offering an obstruction to copulation; but they, also, may generally be relieved by an operation. Extreme narrowness of the canal is seldom the cause of impotence, as it is generally overcome; but extreme shortness is considered as occasionally an incurable cause, though I rather think without sufficient reason, as, though short, it may not be sexually disproportionate. Closure of the orifice of the vagina by membrane is an effectual impediment to coition, and, until removed, to conception; but partial closure may admit of conception. I have attended three ladies in their confinement, in whom the hymen was perfect, the perforation barely admitting the tip of my finger, and the membrane was strong enough to resist the pressure of the head for a considerable time. I am satisfied that "vaginismus" giving rise to imperfect or incomplete connexion, is a not infrequent cause of sterility, but it is easily remedied, and I have known its cure followed immediately by conception.

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* London Journal of Med., vol. i. p. 1166.

† Gream: Lancet, 1849, vol. i. pp. 91–204. Churchill's Diseases of Women.

Functional derangements do not necessarily produce more than temporary sterility. I have seen patients conceive with very scanty menstruation, and I have known them conceive when both sexual desire and gratification were wanting: but as yet I have never known patients other than sterile in whom sexual desire is absent and menstruation deficient. The variety of *dysmenorrhœa* in which lymph is secreted, is considered by Denman and others to preclude conception; this, however, is not universally the case, and the disease in many cases is curable.

Congestion, erosion or ulceration of the cervix uteri, uterine leucorrhœa when excessive, and perhaps vaginal leucorrhœa, may also be included among the curable causes of sterility. The same result obtains temporarily, in cases of irritable uterus, and some diseases of other organs. Mr. Whitehead has lately suggested that the uterine mucus, instead of being alkaline, as in its healthy state, may be rendered acid by certain affections of the uterus; and as the researches of M. Donnè have shown that spermatozoa lose their vitality sooner in acid mucus, it may be a frequent cause of sterility.*

Unsuitable marriages, whether as to disparity of age or constitution, often prove unfruitful; cases are on record of parties who together were sterile, being both fruitful with other individuals. Excessive sexual indulgence often defeats its object.

I have thus cursorily noticed most, if not all, the applicable causes of impotence and sterility in the female. There is, however, a considerable class of unfruitful marriages of which no explanation can be given; we can only conjecture that the ovaries or fallopian tubes are defective, or that some sexual incompatibility exists. The uterus and vagina are within reach of an examination, and their condition can be minutely ascertained by means of the finger, the speculum, and bougies.

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* On Abortion and Sterility, p. 406.

CHAPTER VII.

SPURIOUS PREGNANCY—PSEUDO-PREGNANCY.

It may not be unprofitable here to say a few words upon that curious and obscure disease which has received the above names, and which Dr. Simpson has proposed to call "pseudo-cyesis." Isolated cases of the disease have probably occurred to most men in extensive practice, and numbers of them have been recorded by ancient and modern writers, but the most, if not the only, complete monograph on the subject is a lecture by Professor Simpson,* and I think he will forgive the ample use I must make of it in this chapter.

The phenomena of the disease have essentially an hysterical character; there is almost always some derangement of the menstrual function, with certain reflex irritations, and a swollen state of the abdomen.

Cases of this kind occur in females of all ages. Dr. O'Ferrall has recorded one in a girl æt. thirteen. I have seen one in another æt. seventeen. Dr. Simpson thinks the complaint as frequent during the first year after marriage as at any other time. I have seen it in a woman who had borne several children, and Dr. Montgomery thinks it most frequent at the climacteric period. From the undoubted fact of unmarried females being liable to the disease, it is clear that its recognition is important, not merely for the purpose of cure, but to avoid the injurious suspicions to which the patient would otherwise be exposed.

Symptoms.—I have already mentioned that the abdomen is swollen in various degrees, but rarely, I think, to a very extreme degree. It feels firm and elastic, and as a general rule yields a clear resonance on percussion. This is not always the case, however; for in one case I saw, the upper part of the tumour was rather dull, whilst the lower was quite clear, without our being able to explain the difference. The abdomen is generally equably swollen, but protruding more anteriorly. In women who have not borne children the lumbar region bulges, and is resonant, but when the patient has been pregnant, the tumefaction may assume the exact form of the pregnant uterus, as in a case I saw, where it filled the mould, as it were, left by former pregnancies.

The catamenia are generally deranged, scanty, irregular, or, perhaps, altogether suppressed, and as the breasts very commonly sympathize and enlarge, and the stomach exhibits some reflex disorder, we can easily excuse in an ordinary person the suspicion of the existence of pregnancy.

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* Med. Times and Gazette, Sept. 3, 10, and 17, 1859.

Now, if the person be unmarried, and of a questionable character, it is more than probable that in the estimation of her friends, her character will soon cease to be questionable. If she be married, pregnancy will probably be taken for granted, and the mistake only detected when labour ought to occur, or when, curious to say, some sort of abortive imitation of labour does take place. The mistake is even more likely to occur in women "of a certain age," as they seem rather easily persuaded of an event so creditable to their virility, and of this nature are probably all the stories current of ladies deceiving themselves and their friends. The difficulty is somewhat increased at this period of life by a not unusual increase of fat giving to the enlargement a more resisting feel and a duller resonance. Having decided in favour of pregnancy, from the assemblage of the foregoing phenomena, the patient finds confirmation strong in certain sensations which she supposes to be fœtal movements, but which, when questioned, she admits are not exactly the same as in former pregnancies. And the difficulty of diagnosis is much increased, as Dr. Simpson has remarked, by a repetition of individual peculiarities which occurred in former pregnancies; as, for example, peculiar discolorations of the skin, or eruptions, or neuralgias, or changes of temper.

Nevertheless it should be remembered that there is generally some irregularity or defect in the sequence, or grouping, or character of these symptoms which distinguishes spurious from true pregnancy when minutely investigated, and it is upon this mainly that our diagnosis will depend.

As to the course of the disease, it will vary. The symptoms may disappear after a few weeks or months, or they may continue for about the usual term of pregnancy, and then disappear. Or in some few cases the enlargement and its train of symptoms may go on for twelve or eighteen months, or for some years.

Diagnosis.—Dr. Simpson has truly observed that "however closely all the ordinary symptoms of real pregnancy may be represented and simulated in the spurious affection, and however minutely even the individual idiosyncrasies sometimes seen in the former may be imitated in the latter, there is usually some deviation from the ordinary course of events and some difference in the order and correspondence of the ordinary phenomena, which may serve to put you on your guard, and lead to the discovery of the true state of affairs." The symptoms of early pregnancy may be simulated, but all those of a later period cannot. Suppression of menstruation, sickness of stomach, and increase of the breasts and abdomen, may be present, but they may not have the usual completeness or sequence. Enlargement of the uterus, diminution of its neck, the placental bruit and the sounds of the fœtal heart will not, and their absence at a (supposed) period when they ought to be present, will in competent hands be conclusive.

If the abdomen be pressed between the two hands placed at its sides, we can at once detect that there is no such solid body as the gravid uterus present; and if to this we add careful percussion, we shall be satisfied that the distension is neither by solid nor fluid. An examination *per vaginam* will reveal to us the cervix, and as far as we can reach it, the body, of its normal size when unimpregnated; with the usual mobility, and with an entire absence of direct shock when the abdomen is lightly struck.

The only difficulty in coming to a conclusion will be when the uterus is coincidently retroverted or enlarged by fibroid or other growths, or in case of an ovarian tumour.

Auscultation affords only negative evidence, of course; but in practised hands even this is of great value at a (supposed) advanced period. I need hardly say that on this point we should not trust to one or even two examinations.

But perhaps the best aid we have in our diagnosis is in the effects of anæsthetics. Bring the patient fully under the influence of chloroform; carefully and cautiously at first, but completely at last, and we may observe the abdomen relax in its tension, flatten, and finally subside; thus giving us an opportunity to ascertain the exact condition of the abdominal organs. Wait a little, and as the effect of the chloroform goes off, the abdomen will rise gradually until it attains its previous size.

Taken altogether, the evidence thus obtained will hardly fail to be conclusive.

Pathology.—There may or may not be any uterine or ovarian disease. Some degree of congestion or erosion is not uncommon; with anteversion or retroversion it may be, but it is clear that these do not form an essential part of the disease. Dr. Simpson thinks that "the aggregate of symptoms which we class under the designation of 'spurious pregnancy' in women, is in some way or other dependent upon the changes which occur in the ovaries and in the uterus at the period of menstruation." I think this very likely, but as yet it is only a brilliant suggestion to be tested by minute investigation.

But what is the enlargement? Is it simply a gaseous distension? Apparently not, for in some cases Dr. Simpson introduced a tube into the rectum, and placed the free end in water, whilst the abdomen subsided under the influence of chloroform, but not a bubble of air escaped. He believes that "the phenomenon most probably depends on some affection of the diaphragm, which is thrown into a state of contraction, and pushes the bowels downwards into the abdominal cavity." Although I have no better explanation to give, I confess myself far from satisfied with this.

Treatment.—There are three things to be borne in mind in the treatment of this affection: 1st, that the general health is more or less disturbed; 2nd, that the menstrual function is incomplete; and 3rd, that there may be some special local disease. Whatever the latter be, it is of course to be specially treated, and removed, if possible, concurrently with which an effort should be made to improve the general health. I have no doubt that if we succeed in restoring the regularity of the catamenia, we shall find that a great step will be gained; but it may be a question whether we should immediately have recourse to emmenagogues. It may be first desirable, as Dr. Simpson advises, to endeavour to allay the irritable condition of the uterus and ovaries; and for this purpose he recommends the bromide and iodide of potassium. Five or six grains of the former may be given three times a day, either alone or with from two to three grains of the iodide of potassium. Or it may be applied locally in the form of a pessary. Further, carbonic acid gas, with or without chloroform, may be thrown into the vagina. Such soothing-remedies Dr. Simpson has found very beneficial.

For the nausea and vomiting we may have recourse to any of the remedies usually recommended. Opium, acetate of lead, prussic acid, carbonic acid, ice, creosote, or perchloride of iron or oxalate of cerium, as recommended by Dr. Simpson.

As far as the distension may be due to flatulence, we may seek relief by assafœtida, ox gall, turpentine, the valerianates, powdered charcoal, &c.

The bowels should be kept free by effective but mild purgatives, and the diet bland and nourishing.

CHAPTER VIII.

SUPERFŒTATION.

The term Superfœtation has been applied to those cases of abnormal conception in which a female already pregnant has been supposed to conceive a second time before the termination of the first gestation. The belief in the possibility of such an occurrence is universal among the older writers, and cases are adduced in support of this view, but modern writers have been more divided in opinion; it is denied by Hebenstreit, Ludwig, Nutger, Schmidtmüller, Blumenbach, Beck, &c.; but admitted by Haller, Hervey, Plouequet, Barzelotti, Velpeau, Cuming, &c.

The cases alluded to are such as the following:—1. It is not uncommon for women to be delivered of a full-grown child and a blighted ovum at the same time, and from the disparity between them it has been assumed that the period of conception was different for each.

2. Again, a woman may be delivered of two living children at one birth, or within a few hours of each other, one of which may be fully developed, while the other appears immature.

3. Further, the same woman has given birth to twins, of different colour, as in the case related by Buffon, and quoted by Foderè and all recent writers on the subject, of a woman at Charleston, South Carolina, who was delivered in 1714 of twins, within a very short time of each other, the one being black, the other white. On examination, the woman confessed that on a certain day, immediately after her husband had left her, a negro entered her room, and by threatening to murder her in case of refusal, obtained connexion with her. Dr. Moseley mentions a similar case:—"A negro woman brought forth two children at a birth, both of a size, one of which was a negro, the other a mulatto. On being interrogated upon the cause of their dissimilitude, she said she perfectly well knew the cause of it, which was, that a white man belonging to the estate came to her hut one morning before she was up, and she suffered his embraces almost instantly after her black husband had quitted her."* Cases of the same kind have been published by M. de Bouillon, Drs. Dewees, Trotti, Guerarde, Delmas, Dunglison, &c.

4. Lastly, cases have occurred where the birth of a mature child was succeeded, after the lapse of some months, by the birth

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* On Tropical Diseases, p. 111.

of another. Several such cases might be cited. In the Recueil de la Société d'Emulation, there is one of M. A. Bigaud, of Strasburg, aged thirty-seven, who was delivered of a lively child on the 30th of April. The lochia and milk were soon suppressed. On the 17th of September of the same year (*i.e.*, about four and a half months after the first delivery) she brought forth a second apparently mature and healthy child. On the death of the woman the uterus was found to be single. In the case related by Desgranges, of Lyons, the woman was delivered on the 20th of January, 1780, of a seven-months' child; and on July 6th, 1780, five months and sixteen days after the former birth, she gave birth to a second, which had apparently reached its full time. The late Dr. Maton published a similar case in vol. iv. of the Trans. of the College of Physicians, London. Mrs. T., an Italian lady, but married to an Englishman, was delivered of a male child at Palermo, November 12, 1807. On the 2nd of February, 1808, not quite three calendar months after the preceding accouchement, she was delivered of a second male infant. Dr. Maton assured Dr. Paris that "both the children were born perfect; the first, therefore, could not have been a six-months' child." Other cases may be found quoted by Beck, Velpeau, and Cuming, and collected in the essay of Dr. Alexander Henry.*

Dr. Bonar† has published a very elaborate series of investigations, which leave one on the horns of a dilemma. He has shown that we must either believe superfœtation to be comparatively frequent, or that seven months is not the earliest "viable" age for the fœtus, nor nine months a necessary term of pregnancy. The essay is well worth consulting.

Upon the strength of these cases, it is assumed that a second impregnation may be effected, although the uterus be occupied by the results of a previous conception. Our first object is, therefore, to ascertain how far the cases, considered in themselves, warrant such a conclusion, and then whether, if the cases are not otherwise explicable, we are bound to adopt this theory as the true explanation. First, then, I would observe that the first and second class of cases can be easily explained without having recourse to the doctrine of superfœtation at all. When twins are conceived from the one intercourse, it not unfrequently happens that one ovum is blighted, and sometimes rejected, sometimes retained, and occasionally the appearance of the ovum, when subsequently expelled, will be found to correspond to the period of pregnancy at which symptoms of uterine disturbance and threatened abortion appeared. Again, nothing is more common in twin pregnancy than to find one more fully grown than the other, and nothing more easily explained. So that neither of these cases are any support to the doctrine, because they are susceptible of another and more simple explanation.

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* London Med. Journal, 1849, p. 1087.

† A Critical Inquiry regarding Superfœtation. Ed. Med. Journal, Jan., 1865.

The third class, where children of different colours are brought forth, is equally unavailable; for, at the utmost, they only prove that a double conception may occur from connexion with two individuals, if such intercourse take place with a very short interval. If such cases occurred with an interval of four or five months between the birth of the children, the case would be altered; but I am not aware of any such on record.

It must be confessed that the fourth class of cases is very difficult of explanation, and they are the only ones of any force in support of the theory. It has been supposed, that in such cases both children were begotten in the same moment, but that the tardy birth of the latter was owing to its slower development: but this explanation requires previous proof that a slow growth of the fœtus involves a protracted gestation.

Another explanation has been proposed, based on the fact, that when pregnancy has occurred with a double uterus, one cornu only is occupied by the child. It may in such cases be possible (so it is argued) for the woman to conceive a second time, and the child to occupy the vacant cornu, although the woman were previously pregnant; and in support of this view, a case is adduced which occurred to Mad. Boivin, and which is related in M. Cassan's thesis, On Double Uterus and Superfœtation: "On the 15th of March, 1810, a woman, aged forty, gave birth to a female infant, weighing about four pounds. As the abdomen still remained bulky, Madame Boivin introduced her hand, but could find nothing in the uterus. But the examination led her to suspect that there was another fœtus, either extra-uterine, or contained in a second cavity in the womb. At length on the 12th of May, a second female infant was born, weighing not more than about three pounds, feeble, and scarcely able to respire. The mother assured Madame Boivin that she had had no connexion with her husband (from whom she had been some time separated), except thrice in two months—viz., on the 15th and 20th of July, 1809, and on the 16th of September following." In this case there can be little doubt of the existence of a double uterus, and it would be difficult to disprove that the second child was not the fruit of the last conception, and, if so, a clear case of superfœtation; but, even granting so much, it only proves the possibility of such an event when the uterus is double, and it would not only be very bad logic to assume that the uterus was double in all cases when two children are born at considerable intervals; but it would be inconsistent with facts, for it is expressly stated that in the case of M. A. Bigaud, already quoted, the uterus was found, after her death, to be single.

Thus, whilst we need not deny that a double uterus may afford an opportunity for a double conception, at distant periods, we cannot admit one such case as explaining all the cases of that kind on record; and with respect to such, we have made no advance towards an explanation. Admitting this, are we necessarily to adopt the hypothesis of superfœtation? I think not, because the real difficulties of such a theory appear insurmountable; and, if so, our ignorance of the true explanation is no argument for the adoption of a false one. The physical difficulties are those which depend on the changes induced by impregnation. The reader will find that it has been stated that, shortly after conception, the uterus is lined by the deciduous membrane, a shut sac, closely adherent to the lining membrane of the uterus throughout, and covering the orifices of the os uteri and of the fallopian tubes; that the canal of the cervix uteri is, during pregnancy, plugged with thick tenacious mucus secreted by the glands. Now if this be the case, and if it be an essential condition of generation that the spermatozoa pass into the uterus, if not through the fallopian tubes to the ovaries, it is evident that the theory of superfœtation involves so much apparent physical impossibility, that it must be rejected, unless it can be shown how the spermatozoa can obtain access to the ovaries when the uterus is (as it were) hermetically closed.

Another view has been latterly put forth by Dr. J. M. Duncan, which, if true, would help us to a solution of the difficulty. He states that the decidua reflexa is not in contact with the decidua vera till after the third month, and that up to that time there may be free communication between the ovary and vagina, and consequent liability to a second impregnation.* Additional evidence, however, would be necessary to establish this opinion, and until we possess it, I must honestly confess that I have no better explanation to offer of such cases as Dr. Maton's; but surely it is more philosophical to acknowledge our ignorance, and patiently to wait for additional information, than, in our impatience of a state of uncertainty, to adopt a theory involving such difficulties.

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* Edin. Monthly Journal, April, 1853.

In conclusion, I would say, 1. That the theory of superfœtation is *unnecessary* to explain the birth of a mature fœtus and blighted ovum; of a mature and immature fœtus, born together or within a month of each other; or of fœtuses of different colours, as they may reasonably be supposed to be the product of one act of generation, or of two, nearly contemporaneous. 2. That in cases of double uterus, it is possible for a second conception to take place, and (judging from the subsequent birth of the second child, in the only case on record) at a later period than the first. 3. That in the remaining cases, where one mature child succeeded the birth of another after a considerable interval, we have no proof of a double uterus in any, and positive proof that in one case it was single, and that to the explanation of these cases, no theory as yet advanced is adequate; that of superfœtation being opposed by physical difficulties, which are insurmountable in the present state of our knowledge.

CHAPTER IX.

EXTRA-UTERINE PREGNANCY.

From certain causes, with which we are but partially acquainted, it sometimes happens that the ovum, instead of passing into the fimbriated extremity of the fallopian tube on the bursting of the Graafian vesicle, and being thence transferred into the uterine cavity, in the gradual manner already described, is arrested in some part of its progress, where an effort is made to supply the place of the uterus, and afford space and nutrition for the fœtus. This, however, can only be partially successful, and the fœtus ultimately perishes for want of nourishment. To this misplaced gestation various names have been given—"Extra-uterine pregnancy," "Conceptio vitiosa," "Grossesse contre nature," "Exfœtation," &c. &c.

This abnormal deviation from ordinary gestation was known, but not minutely, to the ancients. Albucasis relates a case of fœtal bones being extracted from an abscess, which had formed near the umbilicus, and similar examples were recorded by Cornac, F. Plater, Cordæus, Horstius, Primrose, Hildanus, Riolan, jun., &c. In more modern times very numerous and well-authenticated cases have been published, and have been carefully collected and referred to by Dr. Campbell in his learned essay on this subject, to which I have been principally indebted for this chapter; and if I need any excuse for the freedom with which I have availed myself of his labours, it must be found in the fact that his assiduity in collecting, and care in referring to the numerous cases on record, as well as the accuracy of his reasoning and the excellence of his practical recommendations, have left little or nothing for me to do but to follow in his steps.*

All the varieties of extra-uterine pregnancy may be reduced to three:—

1. *Ovarian fœtation,* when the ovum is detained in the ovary; 2. *Tubular fœtation,* when the fallopian tube is the seat of the arrest; and, 3. *Interstitial fœtation,* when the ovum enters the parietes of the uterus, but is detained in an interspace of the fibres before it arrives in the uterine cavity.

Dr. Campbell has added another variety, which he calls the *ovario-tubal,* a compound of the two first, when the sac containing the fœtus is formed by the ovary and fallopian tube jointly. A fifth species, *ventral fœtation,* is enumerated by most authors, where the ovum is found in the abdominal cavity; but I think Dr. Campbell is right in supposing such cases to have originally belonged to one or other variety previously mentioned, and for which a separate section is scarcely necessary.

A brief notice of each variety, with the details of a case or two, will be necessary before considering the symptoms and termination, &c. For reference to cases, I beg to refer the reader to Dr. Campbell's book.

1. Ovarian Fœtation.—By some writers the existence of this species of extra-uterine gestation is considered as rather doubtful, on account of the facility afforded for the escape of the ovum after the rupture of the Graafian vesicle, but the evidence of facts is too strong to be resisted.

The earliest example on record is to be found in the Philos. Trans., vol. ii. p. 650, communicated by the Abbé de la Roque. It occurred in 1682: the right ovary was enlarged to the size of a hen's egg, and lacerated through its whole length. The fœtus was found in the abdominal cavity, in the midst of a large quantity of blood.

The following instance I quote from Dr. Campbell; it occurred in the practice of Dr. Granville, and, from his high character, no doubt can be entertained of its accuracy. "The subject of the case was a lady, aged thirty-nine, the mother of seven children. Until Dec. 1818, when she conceived, the catamenia were regular; and from this period till June 9th, 1829, the time of her decease, she experienced various and severe sufferings, and there were occasional discharges of a colourless fluid 'per vaginam.' After death a considerable tumour, soft and movable, was perceived immediately above the pubes, and rather to the left of the linea alba. On reflecting the abdominal parietes, blood to the amount of several pounds was observed to fill every space which the viscera did not occupy. The tumour alluded to was about four times the size of a hen's egg, and displayed the same general black-reddish hue of all the ambient parts. A bloodvessel, the size of a large-crow-quill, which penetrated the dense portion of the tumour, was traced upwards to the descending aorta, and was ascertained to be a branch of the left spermatic. A smaller and much shorter vessel arising from the tumour, was also found to communicate with the spermatic vein, thus establishing a complete circulation to and from the parts. The inferior and left half of the tumour presented a surface, consisting at two or three points of diaphanous membranes, through which a fœtus of about four months' growth was readily discovered. The left ovarium was the seat of the tumour, which, as it gradually enlarged, distended the tunics of that organ in the same progressive manner, in a ratio with its own size. As the fœtus, however, increased further, the ovarium burst in three places; and thus the membranous sac forming the tumour partially protruded into the abdominal cavity. During this destructive process, that part of the parietes of the ovarium to which the placenta was attached was also lacerated, so as to tear the adhesion of the mass, thereby producing sudden and fatal hæmorrhage. The right ovary was sound."

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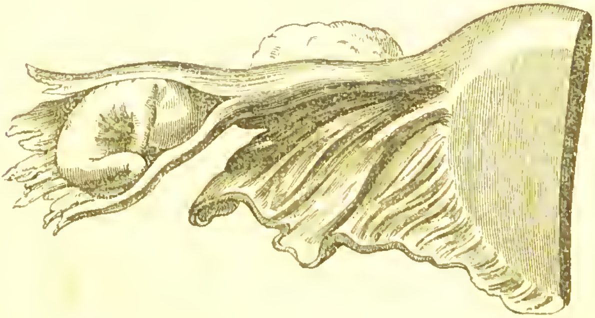
* The Year Book, published by the New Sydenham Society, contains numerous examples of each variety.

2. Tubal Fœtation.—When the arrest of the progress of the

Fig. 60.



embryo takes place at the fimbriated extremity of the fallopian tube, we frequently find that the ovary forms part of the walls of the cyst in which the fœtus is contained, though it is not always easy to point out the exact locality of the arrest. "In some instances," says Dr. Campbell, "it may be presumed that in the incipient stages of gestation, the ovulum is connected with only one of these appendages, either the ovary or the tube; and that the second organ, whether ovary or tube, becomes involved merely in consequence of its state of activity, its progressive enlargement, and the pressure exerted by the ovum, together with the consequent morbid excitement." Such cases constitute the "ovario-tubal gestation" of this author, and to this class he conceives to belong those which have been recorded as examples of "ventral fœtation."

But of all the varieties of extra-uterine gestation, that where the embryo is contained in the tube itself is the most frequent. Riolan published the first well-attested example, and he was followed by Littre, Sanctorinus, Poteau, &c. &c. The following example is taken from the Transactions of a Society for the Improvement of Medical and Surgical Knowledge, vol. i. p. 216. "A married woman in her second pregnancy, in consequence of a bilious complaint to which she had formerly been subject, used some remedies she had been wont to employ, and also a warm bath. She had been obstructed but one period, and paid so little attention to this circumstance, that she did not make it known, either to her husband or to the ordinary medical attendant. On May 13th, 1791, the morning subsequent to her having used the bath, she was suddenly seized, without any previous exertion, with a violent pain in the lower part of the abdomen, followed by syncope, from which she soon recovered. A moderate bleeding and an opiate diminished, but did not entirely subdue, the pain, which now attacked the loins as well as the abdomen, and recurred in violent paroxysms, accompanied by vomiting, yawning, and fainting. On the 16th she was somewhat easier; but towards evening there was an aggravation of her sufferings, accompanied by cold sweats, coldness of the lower extremities, interrupted articulation, great restlessness, with want of pulsation at the wrist, and she expired. *Autopsy.*—Nearly a gallon of blood was found effused into the abdominal cavity; a laceration of an inch and a half in length about the middle of the right fallopian tube; an embryo of the sixth or seventh week in the blood; the uterus lined with decidua, and its cavity filled up with gelatinous matter."

I cannot but notice in this place two cases published by Dr. R.

Lee,* because of the peculiarity of the situation of the membrana decidua :—"A lady died suddenly, in 1829, from internal hæmorrhage, produced by rupture of the right fallopian tube, which contained an ovum. On opening the tube, and examining the different parts of the ovum, I found a deciduous membrane everywhere surrounding the chorion, and closely adhering to the inner surface of the tube, as the decidua usually does to the lining membrane of the uterus in ordinary gestation. Within the decidua the chorion, placenta, amnion, and embryo were distinctly seen." Again, "on the 18th of July, 1836, Mrs. K——, after suffering some time with symptoms of inflammation and retroversion of the uterus, was seized with great faintness, and soon expired. A large quantity of fluid blood was found in the abdominal cavity, and the right fallopian tube was extensively lacerated near its fimbriated extremity. On removing the uterus and its appendages from the body, and carefully examining the ovum contained in the right fallopian tube, it was evident that a deciduous membrane everywhere surrounded the chorion, and adhered to the inner surface of the tube. The uterus was considerably enlarged, and its inner surface was coated with a very thick layer of yellowish-white soft substance, like common adipose matter, and bearing no resemblance to the deciduous membrane. There was no trace of any arterial or venous canal in this coating."

3. Interstitial Fœtation.—This form is the rarest of the three or five; but the following case leaves no doubt of its existence. It occurred in the practice of the late Mr. Hey, of Leeds, and by him was communicated to Dr. W. Hunter. "The patient, aged thirty-five, of a healthy constitution, was seized, when two months advanced in her second gestation, with pains resembling colic, which were subdued by appropriate remedies; but in the sixth month they returned with much greater violence, and were more diffused than formerly." They were repeatedly alleviated, but as frequently returned. When the term of gestation was completed, the movements of the child ceased. Pains came on, but with little effect, and vomiting, which produced great emaciation, and ultimately proved fatal. "*Dissection* exhibited adhesions between the omentum, intestines, peritoneum, and a large peculiar sac, which occupied nearly the whole abdominal cavity. Besides a well-formed fœtus, free from any mark of decomposition, the cyst, which was a line and a half in thickness, contained a quantity of chocolate-coloured

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* Med. Gazette, vol. xxvi. p. 436.

fluid, and some purulent-looking matter. The umbilical cord passed from the fœtus through a narrow aperture into a cavity whose walls were an inch and a half in thickness, but of much smaller dimensions than that which contained the fœtus. This smaller cyst, which must have been the uterus, contained a placenta of a size so unusual that it filled three-fourths of the cavity of the organ; both together weighed two pounds and a half avoirdupois. No trace of cicatrix could be detected in the uterine parietes. The membrane of the ovum, after lining the uterine cavity, was reflected to form the inner lining of the cyst which lodged the fœtus."

Causes.—After the instances I have quoted in illustration of each variety, we may now proceed to inquire as to the causes of extra-uterine gestation, which, however, are by no means easy of discovery. It is possible that either congenital malformation or pathological changes may retain the fecundated germ in the ovary, or prevent its entrance into the fallopian tube, or arrest its progress after its entrance. Narrowness or obliteration of the tube may effect this.

In addition, interstitial fœtation has been attributed to narrowness of the uterine orifice of the fallopian tube, or an unusually large interspace between the fibres, or to a partially cornuated uterus.

But these causes, it is evident, are mainly conjectures.

Symptoms.—The symptoms vary a good deal. So long as the part in which the embryo is lodged can accommodate it, there may be but little disturbance, and nothing to afford grounds for a correct diagnosis. In other cases, the local symptoms resemble those in disease of the uterus or ovaries. In the greater number of cases, there is much suffering from an early period. Certain of the signs of pregnancy may be present, but a degree of irregularity in their intensity will frequently be observed. Thus, the catamenia may be present or absent, and, if present, either scanty or profuse; and not seldom there is hæmorrhage, or a discharge of clots, which have been mistaken for portions of the placenta. The mammary sympathies are excited in most cases, and the changes in the areola take place. The patient may or may not suffer from nausea or vomiting, and in some cases at an early period the fœtal movements have been felt by the patient. The increase of the abdomen generally differs from that in ordinary pregnancy, being more to one side, and the pain or uneasiness may be limited to the spot where the tumour is felt. M. Chaussier lays great stress upon a sense of weight and uneasiness, deeply seated in the pelvis, and occasionally extending to the kidneys.

An examination per vaginam reveals a great deviation from the state of the organs in ordinary gestation. The os uteri may be high or depressed, but it is very seldom drawn out or dilated; in fact, it is generally as it was before impregnation, or nearly so.

When the cyst in which the ovum is contained bursts, however, a series of new and alarming symptoms are superadded. The patient complains of great uneasiness or pain suddenly occurring, languor, debility, and exhaustion to an extreme degree; there is sometimes a sanguineous discharge from the vagina, with dysuria, tenesmus, irritable stomach, &c.; in short, the patient exhibits the symptoms of collapse from loss of blood.

In tubal fœtation, these symptoms generally come on more suddenly than in the other varieties, so as at once to excite suspicion of a rupture of some internal organ having taken place.

In interstitial fœtation, the symptoms are a modification of those in the other varieties. In some there are abdominal pains and sanguineous discharges, in others these are absent; but in all the cases on record the tumefaction and fœtal movement were confined to one side of the abdomen. It is also remarkable, that in all, the child appears to have lived to the term of utero-gestation.

I have already stated that matters may go on more or less quietly for some time, not without injury to the health of the mother, but without danger to her life. However, the crisis must come sooner or later, when the cyst gives way, and symptoms of collapse set in, followed by those of inflammation. This crisis may be hastened by various circumstances, such as violent action of the abdominal muscles, and the consequent pressure upon the tumour, sudden shocks, or blows upon the abdomen, coughing, vomiting, &c. The rupture of the cyst may be followed shortly by fatal results, owing to the shock to the system, the hæmorrhage, subsequent inflammation, or from one or more of these consequences combined.

But there are many exceptions to such prompt terminations. The patient may survive shock, hæmorrhage, and subsequent inflammation, and the parts may accommodate themselves to the presence of the fœtus, so that the patient shall recover a certain amount of health, and suffer but little local inconvenience; nay, she may even again conceive and bear children; "nine women conceived *once* during the retention of the extra-uterine fœtus; two *twice*; one *three* times; one *four* times; one *six* times; and one *seven* times."

The period during which the fœtus may be retained before the mother's death or its own expulsion varies much. Dr. Campbell gives the following account of seventy-five cases; it was retained "three months in two instances; four months in one; five months in one; nine months in two; fifteen months in three; sixteen months in two; seventeen months in two; eighteen months in seven; one year in five; two years in eight; three years in seven; four years in four; five years in one; six years in two; seven years in three; nine years in one; ten years in three; eleven years in two; thirteen years in one; fourteen years in two; sixteen years in one; twenty-one years in one; twenty-two years in one; twenty-six years in two; twenty-eight years in one; thirty-one years in one; thirty-two years in one; thirty-three years in one; thirty-five years in two; forty-eight years in one; fifty years in one; fifty-two years in one; fifty-five years in one; and fifty-six years in one case."

Professor Dyce, of Aberdeen, has favoured me with a case in which the fœtus was retained in the abdomen eight years: the patient was twice pregnant afterwards, and delivered of living children, but sunk some months after with hectic symptoms.

These cases afford a striking instance of the power of the human frame to adapt itself to new and apparently adverse circumstances. In many cases, after some time, an effort is made to get rid of the foreign body by artificial openings; thus the fœtus may be passed piecemeal through the abdominal parietes, the colon, rectum, or vagina. In some rare cases, fœtal bones have made their way into the bladder.

Experience alone could have convinced us of the possibility of the fœtus living in these misplaced gestations; yet it may continue to draw nourishment and exist for any period within the full term of gestation. "In ninety-eight cases," says Dr. Campbell, "in which we can decide, or nearly so, on the stage of pregnancy, the fœtus in seventy-nine patients died at the close of nine months, or soon thereafter; one in the eighth; seven about the seventh; one in the sixth; two in the fifth; two in the fourth; five in the third, and one at the end of the first month."

The development during the life of the fœtus appears to proceed at the ordinary ratio, and subject to the laws of normal gestation; the placenta, cord, and membranes are obvious before decomposition takes place; but the placenta is generally thinner than usual. Authors have differed as to whether the ovum receives an additional covering or not, analogous to the decidua; but the evidence adduced by Dr. Campbell and Dr. R. Lee's recent researches seem conclusive in the affirmative; and it is probable that this membrane, which closely resembles the decidua, may perform an office similar in the nutrition of the fœtus. The part to which the placenta is attached receives an increased vascular supply for the occasion.

Almost all writers have described the uterus in these cases as lined with (so-called) deciduous membrane, though in some cases much hypertrophied; but in one of Dr. Lee's cases it was absent, and he doubts whether, when present, it possesses "an organized vascular structure, similar to that of the true decidua."

Treatment.—If we are satisfied of the nature of the case, the first indication is to prevent or postpone the laceration of the cyst in which the ovum is contained, and which so often proves fatal. With this view, undue exertion of every kind is to be avoided, and all circumstances likely to excite uterine irritation. No pressure should be made upon the tumour, and any uneasiness in it should be allayed as promptly as possible by venesection, leeches, or opium.

When the rupture takes place, marked by the sudden giving way, collapse, and exhaustion, &c., the second indication is to moderate the effusion and support the strength; for which purpose the patient should be placed on a hard bed, with her head low, and the abdomen firmly compressed by a binder, over which cold should be applied, by means of pounded ice in a bladder.

Acetate of lead may be of service, with suitable stimulants and broths.

Should we succeed in relieving the state of collapse, we must next combat the inflammation which will set in, by the abstraction of blood, calomel and opium, blisters, &c.

As the child dies soon after the rupture of the cyst in most cases, we must next endeavour, by quietness and the absence of excitement and irritation, to aid the natural powers in accommodating themselves to the new circumstances of the case. The bowels must be kept free by gentle laxatives, and any renewal of the pain must be met by the application of a few leeches or an anodyne.

If we find after a time that any effort is made to remove the fœtus by the formation of an abscess or fistulous communication and discharge of fœtal bones, it may in some cases be advisable to assist the process by enlarging the opening in the abdominal, vaginal, or rectal parietes; but this should be done with great judgment and care, as serious hæmorrhage may ensue, and we are never to forget that nature is generally competent to complete the process she commences.

Any subsequent inflammation must of course be treated in the usual manner.

CHAPTER X.

PATHOLOGY OF THE FŒTUS.—SIGNS OF ITS DEATH.

When describing the contents of the gravid uterus, a short notice of the principal pathological changes to which they are exposed was appended, so that I need not recapitulate them here. They, however, with the diseases to which the fœtus is obnoxious, constitute an important deviation from normal gestation. The latter remain for notice at present.

Abundant observation has proved that the fœtus is liable to almost all the forms of disease which attack the child; that many of them are quite independent of the maternal state; but that, in addition, it may be affected secondarily through the mother. Amongst the examples of the latter, must be classed those cases of premature births which occur during epidemics, and where the fœtus appears to have participated in the disease of the mother, as in the observations of Rœderer, Wägler, Schmurrer, and Russell. I have observed a considerable quickening of the action of the fœtal heart some days after pregnant women have been attacked by fever.

According to Duettel, Schweig, Zurmeyer, &c., children born of mothers suffering under *intermittent fever*, have exhibited the same disease immediately after birth.

Many cases have been recorded by Hildanus, Bartholinus, Möllenbroccius, and, in later times, by Van Swieten, Mead, Baker, Lynn, Jenner, Simpson, &c., of children born with *small-pox*. *Measles* have also been observed in new-born infants by Osiander, Stark, Girtanner, Orfila, &c. Nor are they exempt from other diseases of the skin, as *erythema*, *strophulus*, *pemphigus*, &c.

There is scarcely any internal organ which has not been observed to be the seat of inflammation. The presence of *hydrocephalus* is the result of inflammation (acute or chronic) of the arachnoid. Hoogween, Veron, and Cruveilhier, have recorded cases of *pleurisy;* Mende and Koelpin have observed *abscesses* of the lungs; Zierhold, *œdema;* and Wrisberg, *scirrhous* induration; Husson, Chaussier, and Billard, have discovered *tubercles;* Cruveilhier, *lobular pneumonia;* and Lobstein, *calcareous deposition* in these organs. Brachet, Chaussier, Dugès, Billard, Carus, Simpson, &c., have observed cases of *peritonitis;* Chaussier, of *enteritis, &c.*

Of the cause of such attacks we know little or nothing.

Chronic diseases are even more numerous: the fœtus may suffer from a general *hypertrophy*, or *atrophy*; may be attacked with various forms of *syphilitic disease*; may labour under *worms, calculus, dropsy, jaundice*, or *hernia*; and the pancreas, liver, or kidneys may exhibit organic pathological changes.

The bones and joints are not unfrequently diseased: thus, for instance, children are born with *rickets*, as related by Osiander, Carus, Otto, and others; with *caries*, as observed by Carus and Joerg; or *necrosis*, as in M. Billard's case. Numerous cases of fractures and dislocations of different bones are on record.

This brief and imperfect sketch will suffice to prove the truth of the statement made at its commencement, that the fœtus does not enjoy an exemption from disease whilst "in utero;" unfortunately, we possess neither the means of detecting nor of curing these affections. The subject is, nevertheless, one of great interest: to enable any of my readers to pursue the investigation further, I shall subjoin the names of some of the authors who have written expressly upon it: Murat,[*] Osiander,[†] Joerg, Carus,[‡] Mende,[§] C. W. Hufeland,[||] Meissner,[¶] Hardegg,[**] Billard,[††] Bergk,[‡‡] Zurmeyer,[§§] J. Grœtzer,[||||] Prof. Simpson.[¶¶] M. Grœtzer's work is an excellent summary of the labours of his predecessors, and Prof. Simpson's Essays are equally admirable for their research, careful observation, and logical deductions.

Death of the Fœtus.—But although we may not be able to detect disease in the fœtus, it is often of great importance to ascertain whether it be dead or alive, and it is therefore desirable, if possible, to determine what are the *signs of its death*. The question *may* be of consequence to the medical jurist, and *is* always to the obstetrician, as influencing our decision as to the best time for operations.

The diagnosis of a dead fœtus is confessedly very difficult: since the time of Mauriceau the subject has been investigated by many writers, and still, notwithstanding the powerful aid afforded by the stethoscope, many cases are exceedingly doubtful; and for obvious reasons, since most of the symptoms upon which we must rely depend upon the sensations of the mother, and sensations are notoriously delusive.

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[*] Dict. des Sciences Méd. Art.: Fœtus.

[†] Handbuch der Entbingdungskunst.

[‡] Zur Lehre von Schwangerschaft, &c.

[§] Ausführliches Handbuch der gerichtliche Medizin.

[||] Die Krankheiten der Ungebornen, 1827.

[¶] Kinderkrankheiten, 1829.

[**] De Morbis Fœtus Humani.

[††] Mal des Enfans nouveaux-nés.

[‡‡] De Morbis Fœtus Humani.

[§§] De Morbis Fœtus.

[||||] Die Krankheiten des Fœtus, 1837.

[¶¶] Ed. Med. and Surg. Journal, vol. l. p. 39; vol. lii. p. 17. Ed. Monthly Journal of Med., April, 1849.

The signs which are given as evidence of the child being dead are: the cessation of its movements; the subsidence or flaccidity of the abdomen; the recession of the umbilicus; the loose feel of the uterine tumour, and its rolling about in the abdomen; a sensation of dead weight and coldness in the abdomen; the breasts suddenly become flaccid, and their secretion suppressed; the health being deteriorated; the appetite bad; the countenance sunk; a dark areola round the eyes; fœtid breath; repeated rigors, &c. Dr. Eastlake considers a change in the uterine souffle to a "muffled sawing noise," as indicative of the death of the child. This will be of great value if confirmed by further observation. Taken separately, none of these signs are certain: the movements of the fœtus may be suspended for some days without its being dead; the degree of tension of the abdomen varies much in the course of pregnancy, especially in women who have had several children; the uterine tumour is occasionally felt as a weight (as it were a foreign body) by women who bring forth the child alive; the coldness is a mere sensation, and therefore of little value, a dead fœtus not being really colder than a living one; and the health may be deteriorated, and a dark shade appear under the eyes, from many causes beside the death of the fœtus. The breasts, however, seldom become flaccid, after having been tense, from any cause but the death of the child. Besides, it is a matter of common experience, that women retain a dead fœtus "in utero" for weeks or months, and exhibit few or none of these symptoms. In such cases women have even fancied that they felt the fœtal movements up to the time of labour, without any change in the abdomen, breasts, or general health.

But although taken singly, none of these signs are conclusive, yet cases occur in which the concurrence of several is nearly so. Suppose, for example, that in the sixth month of pregnancy a patient should find the motions of the child, which up to that period had been lively, cease; and soon after observe that the abdomen and uterine tumour had lost their tense and rounded form, at the same time feeling the latter weighty and rolling loosely in the lower belly, and finding the breasts, which had been tense, firm, and glandular, subside and become flaccid, we should undoubtedly have *almost* proof of the death of the child. The value of these signs in short consist in their concurrence, and in their contrast to the patient's previous condition and sensations.

We have found the value of auscultation in detecting pregnancy by proving the life of the fœtus, and it may very naturally be asked, what evidence does it afford of its death? in other words, as the hearing the pulsations of the fœtal heart proves the child to be alive, does their being inaudible prove that it is dead? I have already stated that in some cases, although the child be alive, yet the sound of its heart is inaudible, or temporarily suspended, and such cases of course prevent a directly affirmative answer to the question. Again, much depends upon the tact and experience of the auscultator; one person may detect a pulsation that is inaudible to another: to pronounce, therefore, that a fœtus is dead because we do not at any *one visit* hear the heart, would be too hasty a conclusion. But if after hearing the heart pulsating distinctly, we find it gradually or suddenly become inaudible, and continue so, the evidence will be very strong; and if, in addition, the principal symptoms above enumerated be present, there can be little doubt of the death of the fœtus. Dr. Simpson attaches importance to the sudden increased frequency of the fœtal heart as indicative of impending danger, and my own experience would lead me to concur with him, although it may certainly be only temporary.

Thus far we have considered the signs of the death of the fœtus, during utero-gestation previous to labour; when this process commences, other and more distinctive evidence is accessible.

On the rupture of the membranes when the fœtus has been some time dead, the liquor amnii is frequently changed, being of a dark colour, and of thicker consistence than usual; but if the death be recent, no such alteration will be found. Great stress is laid upon the state of the scalp and bones of the cranium, and, I believe, justly. After the fœtus has been dead some time, if the finger be pressed upon the scalp, it is felt to be emphysematous, crepitating under the touch, and a portion of the cuticle will peel off. The bones of the skull also overlap more, and feel loose within the scalp. When present, these signs are, I believe, conclusive, but the latter only will be found if the death be recent. It is stated by Dr. Parr and others, that no tumour is formed upon the head of dead children; this, however, is only true when the child has been some time dead. I have seen distinct, well-formed tumours on the head of children who had been dead twenty-four hours. The absence of pulsation at the greater fontanelle, and its diminution from the collapse of the bones, is admitted to be an important sign.

In *face presentations*, when the child is dead, the lips are flabby, the tongue flaccid and motionless, and the presenting part slightly swelled. In *breech presentations*, the sphincter of a living child resists or contracts upon the finger, but when dead it is relaxed. The discharge of meconium is of no value in breech presentations, and of very little in any other. When the *arm* protrudes, it shortly becomes livid and cold, and the pulse at the wrist often imperceptible, but this does not prove the child to be dead. The peeling of the epidermis is conclusive. In *prolapse of the funis*, the pressure to which it is exposed very soon destroys the child, and in most cases the presence or absence of pulsation in it is a satisfactory test of the life or death of the child. Dr. E. Kennedy, however, records a very instructive exception to this rule: the cord had been prolapsed for an hour, and during a pain no pulsation was perceptible; when the pain subsided, he "drew the funis backward towards the sacro-iliac symphysis, and then was able to detect a very indistinct and irregular pulsation, which corresponded to a slight fœtal pulsation over the pubis." The forceps were in consequence applied, and the child was saved.

Dr. Collins and Dr. E. Kennedy regard the evidence afforded by the stethoscope during labour of the child's life or death as conclusive, or nearly so; certainly the information thus obtained of the changes which occur in the fœtal circulation is extremely valuable, and the gradual diminution in frequency and force of the heart's action, and its ultimate cessation, will justify our belief in the death of the child. It must be remembered that it is not simply the absence of pulsation that is to determine our opinion, but its cessation after having been heard.

CHAPTER XI.

ABORTION.—PREMATURE LABOUR.

The expulsive action of the uterus may be exerted at any period of gestation, though it appears more easily excited at or previous to the third month, on account of the frailty of the connexion between the ovum and uterus. It is also more liable to occur at the time of each month, corresponding to a menstrual period, than during the interval, in accordance with the periodicity peculiar to the female generative system.

If it occur before the sixth month, it is called an *abortion;* subsequent to this period, *premature labour*. It is always an untoward event, and may exert an unfavourable influence upon the health of the female, but it cannot be considered as dangerous, unless it be accompanied by great hæmorrhage, and even in such cases it is rarely fatal.

Frequency.—Dr. Collins met with at least 393 premature cases in 16,414; Dr. Beatty met with 21 premature cases in 1200. In my own report, 65 cases of abortion are recorded in 1705 deliveries; Madame Lachapelle records 116 cases in 21,960 cases of pregnancy; M. Deubel 35 in 420; making in all 530 premature cases in 41,699 deliveries, or 1 in 78½.

Mr. Whitehead has recently published some statistics of abortion from which I shall give an extract. "Two thousand married women in a state of pregnancy, admitted for treatment at the Manchester Lying-in Hospital, were interrogated in rotation respecting their existing condition and previous history. Their average age at the time of inquiry was a small fraction below 30 years. The sum of their pregnancies, already terminated, was 8681, or 4·38 for each; of which rather less than 1 in 7 had terminated abortively. But as abortion seems somewhat more frequent during the latter than in the first half of the child-bearing period, the real average will, consequently, be rather more than 1 in 7." Of 747, all had aborted once at least, some oftener. "Their average age was 32·08 years. The sum of their pregnancies was 4775, or 6·37; that of their abortions 1222, or 1·63 for each person." From the preceding statements it appears that more than 37 out of every 100 mothers experience abortion before they reach the age of 30 years. As to the pregnancy most likely to be prematurely terminated, Mr. Whitehead states that of 226 women pregnant for the second time, 20 or 8·8 per cent. had aborted of the first, and of 230 pregnant for the third time, 58 or 25·20 had previously aborted. Of 602 cases, abortion occurred at the following periods: in 35 at 2 months, in 275 at 3 months, in 147 at 4 months, in 30 at 5 months, in 32 at 6 months, in 55 at 7 months, and in 28 at 8 months.*

Causes.—The causes of abortion may be either maternal or ovuline.

1. The *maternal* causes may arise from the condition of the mother, or they may be accidental. That certain states of the constitution, or of the general health, render the patient obnoxious to this accident, there can be no doubt; and Denman is probably correct in attributing many cases to this rather than to the specific cause assigned; for as he observes, "that about which the patient was employed, when the first symptom appeared, is

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* On Abortion and Sterility, pp. 245–6.

fixed upon as the particular cause, though probably she was before in such a state that abortion was inevitable." The habits of life have also a considerable influence, for we find abortion most frequent in the extremes of society.

On the other hand, it is wonderful with what tenacity the ovum is retained by persons of delicate constitution, and under very trying circumstances: thus women far gone in consumption conceive, complete the term of utero-gestation, and are delivered of healthy children. And Mauriceau mentions a case* of a woman who fell from a window in the third story of a house, in the seventh month of pregnancy, and broke one of the bones of her fore-arm, dislocated her wrist, and bruised herself very much; yet she fulfilled the period of pregnancy, and was delivered of a living child. Dr. Davis also relates the case of a lady who was thrown from her horse, when three or four months pregnant, and much bruised, yet without interruption to gestation. So that we cannot pronounce, *à priori*, that delicate women will abort, although it is undoubtedly a case far from uncommon.

When this constitutional or local susceptibility is extreme, a very slight shock indeed will be sufficient to cause the accident: thus one lady will miscarry after having a tooth drawn, another from making a false step going downstairs, &c.; and in one case I attended, it seemed to be brought on by the lady's reading an account of a railroad catastrophe, and in another by a hearty laugh.

Certain local disorders are said to cause abortion, as leucorrhœa, uterine irritation, a patulous state of the os uteri, diseases of the rectum, bladder, &c.

Mr. Whitehead mentions that of 747 women, the sum of whose abortions amounted to 122, the assigned causes were as follows:—

"Inward weakness," impaired health, and acute disease	911
Accident, mental perturbation, &c.	222
No assignable cause	90

This "inward weakness" to which so many attribute their miscarriages, is, in fact, leucorrhœa, arising from disease of the lower portion of the uterus. Out of 378 cases an examination showed that 275 were thus affected with inflammation and superficial erosion of the cervix, varicose ulceration, œdema, fissured ulceration, induration of the cervix, endo-uteritis, follicular ulceration, syphilitic disease, &c., thus confirming the statement of M. Boys de Loury and Dr. Bennet as to ulceration being a common cause of abortion.

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* Observation 242.

The same consequence may follow febrile complaints: thus a patient will often miscarry during the course of typhus fever, small-pox, scarlatina, measles, &c., but it is possible that the miscarriage in these cases may result from the death of the fœtus, and not directly from the disease. In this way probably it is that syphilis gives rise to abortion or premature labour.

Among the accidental causes of abortion may be enumerated blows, falls, violent concussions, excessive or sudden exertions, straining, severe coughing, &c., which in most cases act by separating partially the ovum from the uterus.

Mental emotions, anger, joy, sorrow, good or bad news, suddenly told, may excite the uterus to action, and effect the expulsion of its contents.

Lastly, a female may acquire a habit of aborting. Each occurrence predisposes to a repetition of the accident at about the same period; and after it has happened several times, it is extremely difficult to carry her safely over that period. Thus Dr. Young, of Edinburgh, had a patient who miscarried thirteen times in succession, and Dr. Schultze one to whom the same accident happened twenty-two times at or about the same period of gestation. I was myself consulted by a lady who stated that in less than three years she had miscarried ten or twelve times during the second month of gestation. It is remarkable, that these patients seem to have as great an aptitude for conceiving as for miscarrying.

Dr. Tyler Smith* has divided the causes of abortion into excentric, centric, and special, so far as the mother is concerned. The former includes the causes already mentioned, which act by irritation of the mammary, trifacial, vesical, and uterine nerves; the second, those which act through the medium of the blood, as scrofula, syphilis, the exanthemata, &c.; and the third includes cases of disease.

2. The *ovuline* causes of miscarriage may be stated generally to be anything which compromises the life of the child, whether the ovum be thereby detached or not. Thus certain pathological conditions of the amnion, chorion, decidua, the erroneous insertion of the funis, diseases of the placenta, especially fatty degeneration,† separation of the ovum, &c., must necessarily inter-

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* On Parturition, &c., p. 127.

† Dr. Barnes on Fatty Degeneration of the Placenta, Med. Times and Gaz., March 19, 1853.

fere with the perfect nutrition of the fœtus, and perhaps cause its death and subsequent expulsion. Or the fœtus may die of some of the diseases mentioned in the last chapter. As a rule, it may be stated that the death of the fœtus will be followed by its expulsion, but the period of this occurrence varies very much; a few days only may elapse, or it may be months, or, in a few rare cases, years. I think, also, that the evidence we possess shows the much greater frequency of the ovuline than the maternal causes of abortion; and if so, we must conclude, that as it is better that a blighted fœtus should be thrown off, so abortion in many, if not most instances, is a salutary effort when not complicated.

The occurrence of hæmorrhage from internal or external causes is not an unfrequent cause of abortion, partly from the injury done to the fœtus, and partly from the distension and irritation of the uterus. The blood may be effused between the uterus and decidua, between the decidua and chorion, between the chorion and amnion, into the substance of the placenta, or into the cavity of the amnion. It has also been poured into the peritoneal cavity, probably through the fallopian tube, as noticed by Botal, Ruysch, and Smellie.

Symptoms.—When threatened with a miscarriage, the patient generally experiences a sense of uneasiness, languor and weariness, with aching or pain in the back; after these preliminary symptoms have lasted for some time, those of labour supervene, and in most cases they do not differ much from those of labour at the full term; the pain may even be as great.

A slight discharge of mucus or blood from the vagina is observed, pains are felt in the back, extending round the loins to the abdomen, and down the thighs, recurring at regular intervals, and increasing in strength and frequency. The stomach frequently becomes irritable, and discharges its contents. The pulse is quickened, the skin hot, voluntary efforts are made in aid of the uterus, and ultimately the contents of the womb, or a portion of them, are expelled.

But although these symptoms are generally present, yet the progress of different cases is so dissimilar, that we must enter a little more into detail. 1. Occasionally cases occur where the ovum slips out of the uterus (so to speak) with scarcely any pain, little or no hæmorrhage, and followed by a speedy recovery. We see this chiefly in persons who have acquired the habit of aborting. 2. Other patients present the ordinary symptoms of labour, as enumerated above, but which subside after a time, without the expulsion of anything from the uterus, until the expiration of the full term of utero-gestation, when the birth of a full-grown child is accompanied by the expulsion of a blighted fœtus, the case being one of twin conception. 3. Again, the pains of labour may come on with more or less flooding, and after some time the fœtus alone be expelled, the shell of the ovum being retained. The latter is generally detached after a time, or it may be dissolved, and discharged along with the lochia. So long as it remains, hæmorrhage is to be feared; and in some cases where it dissolves by putrefaction, irritative fever or uterine phlebitis is excited; such cases, therefore, excite great anxiety, and require careful treatment: although in other cases the shell of the ovum dissolves, and is discharged unconsciously, with no unpleasant symptom whatever. 4. Very alarming hæmorrhage may precede or accompany abortion. I cannot say that I ever met with a case in which it proved fatal, though I have seen life reduced to the lowest ebb. It is also important to remember that flooding scarcely ever continues after the expulsion of the ovum. 5. There are two very remarkable cases on record by Dr. A. Wood and Dr. Malcolm, in which tetanus supervened upon early abortion, on the eighth and sixteenth day respectively. Both patients died;* and other examples have been collected by Dr. Simpson in his essay,† and will be quoted in the chapter on Tetanus.

The flooding may be caused by external accidental circumstances, such as blows, falls, &c., or it may result from some condition of the ovum or its vessels beyond our cognizance; it may be internal for a time, and afterwards escape, or it may be discharged *per vaginam* from the beginning. There is of course no difficulty in the diagnosis in the latter case; but it is not always easy to detect internal hæmorrhage. In general, the patient becomes pale, exhausted, and faint, with a dark shade under the eyes, and a quick, weak pulse. She complains of headache, lassitude, slight shivering, occasional dull pains in the pelvis, weight about the rectum, perhaps a difficulty in voiding urine, tightness of the epigastrium, &c., with reaction at intervals. The uterine tumour, if above the pelvis, will be found unusually tense, and larger than the supposed period of pregnancy would warrant. After a time, the distension of the uterus excites contraction, then the membranes give way, and the blood escapes. The fœtus is of course lost. The intensity of the symptoms, and the injury to the mother, are in proportion to the amount of the flooding, which, in fact, constitutes the primary danger of an abortion. Generally speaking, the flooding is less the nearer the gestation is to its completion.

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* Edin. Monthly Journal, March, 1850.

† Ibid., Feb. 1854.

In making an examination at an early stage of abortion, I have almost always found the uterus *high* in the pelvis, and in some cases so much so that before the third month of gestation the uterus could be felt above the pelvis.

Treatment.—The first question that occurs to us when called in to a case of threatened miscarriage is, whether it *can* be averted. If we possessed any means of ascertaining the state of the ovum and fœtus, the question will probably be, whether it *ought* to be averted; for certainly when the fœtus is dead or seriously injured, it is much better that it should be cast off. But we do not possess this knowledge, and must therefore content ourselves with the conviction, that if the vital relation between the ovum and uterus be compromised, it will be expelled, and in the meantime use the most suitable means to arrest, if possible, the progress of the case, or to avert danger from the mother.

If the hæmorrhage be very slight, and the pains very trifling, our efforts may be successful; but if the pains have continued for some time, and are accompanied with bearing down, and especially if there be much flooding, there is little hope of success. I have never seen a case in which it was necessary or even advisable to take blood from the arm; but the patient should repose on a hard bed, lightly covered with clothes, in a cool room, and be kept in perfect quiet, mental and bodily. All causes of irritation, excitement, or distress must be removed, and stimulants of every kind avoided. We may then attempt to suspend the uterine action, by means of opium, or some of its preparations, in full doses.

The hæmorrhage may be successfully treated, at this stage, as I have repeatedly found, by means of the tincture of Indian hemp, in doses of five or six drops every two, four, or six hours. Or we may have recourse to the acid mixture, which should be strongly acid, but in which I have not much faith; and applications of cold water to the vulva, or enemata of cold water.

If our attempt thus to arrest miscarriage fail, we must then act according to the circumstances of the case. The most important point is the hæmorrhage; for though it may not risk life directly, it may seriously impede recovery, and leave the health much injured. If there be little hæmorrhage and the pains increase and expel the ovum, little treatment will be necessary.

If the fœtus alone be expelled, we may wait awhile (if no flooding occurs) to see if the uterine efforts will detach the secundines; if not, perhaps we may be able to reach the lower portion of them with the finger, and gradually withdraw them; if this fail, we may frequently succeed with the ergot of rye.

But there are many cases in which none of these plans will succeed. Are we then to leave the case to nature? In many cases we may, but in others we know that after a time the shell of the ovum will putrefy, dissolve, and be discharged; and experience proves that this process sometimes involves considerable danger: danger of hæmorrhage first, and afterwards of uterine phlebitis. I shall speak of the treatment in cases of flooding presently; and with regard to the danger of uterine phlebitis from absorption of a putrid ovum, it may be sufficiently imminent to warrant interference. The French recommend a pair of long thin forceps, with which the ovum is to be seized and removed; but against such an instrument there lies the serious objection, that we cannot be certain of not injuring the uterus, unless we introduce the finger also. I have contrived an instrument which I think may be useful when the end of the ovum protrudes from the os. It consists of a steel rod, divided into three claws at one extremity, which expand widely when free. It is enclosed in a small flexible catheter, and when this is pushed towards the termination, it closes the claws; when retracted, the claws open. The ovum may thus be seized without danger of injuring the uterus, and we can use it where it would be difficult or very painful to introduce the hand into the vagina.

The late Mr. Wainwright, of Liverpool, published a short paper in one of the journals, in which he recommended extraction of the ovum by introducing the hand into the vagina, and one, or at most two, fingers into the uterus. That this is practicable, and in certain cases advisable, I know by experience, having repeatedly practised it; but it must be remembered that it is not free from danger, and before we have recourse to it we should be satisfied that the natural powers will not act, even under the influence of ergot. Further, if done at all, it should be before the secundines have putrefied, or irritative fever set in.

Thus far I have spoken of the treatment of the simpler forms of abortion; let us now proceed to consider those cases which are complicated with flooding. When it is considerable, there is little or no chance of preventing miscarriage, and as the danger from hæmorrhage ceases with the expulsion of the ovum, our endeavours must be directed to moderate the discharge, until that event take place. The most direct means of restraint we possess is *the plug;* but this must never be used, if internal hæmorrhage *can* take place to such an extent as to destroy life: in other words, not if the uterus be empty, and the patient far advanced in pregnancy. If the uterus be filled with its natural contents, or be only slightly distensible, even though empty, we can restrict the amount of loss by filling the vagina, and stopping the external outlet. For this purpose Dewees recommends a sponge, others a silk handkerchief, or tow; but I have found cotton wool by far the best, and most easily introduced through a speculum. The vagina must be filled completely, and after six or eight hours the plug should be withdrawn, and, if necessary, a fresh one introduced.

Cold should be applied to the vulva, by means of a cloth dipped in cold water and suddenly applied: it may be removed after the shock is produced, and re-applied at intervals. I have also seen great benefit from enemata of cold water. Opium in small doses is very useful, nor does it suspend the uterine contractions; and the tincture of Indian hemp, as before recommended. Drs. Dewees and Conquest recommend the acetate of lead; and others, large doses of dilute sulphuric acid in infusion of roses, gallic acid, tannin, or Ruspini's styptic; but I cannot say that I have obtained much benefit from them.

When the plug is removed, we should carefully examine the os uteri, so as to ascertain if the ovum be descending; if we are able to reach the lower end of it, it is often possible, by a little dexterity, to hook it down. If it be beyond our reach, we may replace the plug, and give ergot to excite the uterus to action. Borax is highly esteemed in Germany, and has been recommended by Dr. Copland, for its influence in exciting uterine contraction; it may either be given alone or combined with the ergot. After the ovum is removed, it will be well to have the vagina syringed twice a-day with tepid water. It soothes the parts, and removes any putrefying blood or irritating discharge. But supposing that although by these means the hæmorrhage be arrested, yet that the ovum is retained without any evidence of irritative fever, are we to interfere for its removal? I think not. In such cases, I give half-drachm doses of ergot occasionally, watch the patient carefully, plug when necessary, and wait. After the lapse of days or perhaps weeks, the ovum may be expelled in one or several masses, or a change in the amount and character of the discharge will warrant us in concluding that the ovum is dissolving and coming away. Longer experience has made me less fearful of leaving these cases to nature, and more unwilling to interfere hastily.

In the majority of cases, the natural efforts, or the means just recommended, will succeed in expelling the ovum; but in some they fail, and the patient may be reduced to the verge of death by the flooding, which is kept up by the presence of the ovum. In such cases a more direct interference has been recommended. M. Levret advises warm-water injections into the vagina and uterus; Dr. Dewees, the use of a wire crotchet; and some French writers (as already mentioned), the use of a delicate pair of forceps. The use of any instruments of this kind will require great care, and can only be safe so far as their application can be regulated by the finger. In many cases, where the parts are dilatable, two or more fingers may be easily introduced, and the ovum extracted, or the hand may be introduced into the vagina, and the ovum swept out of the uterus by one finger. I have several times had occasion to perform this operation in extreme cases, and I have been able to do so with perfect success, as far as the extraction of the ovum is concerned, and without any unpleasant consequences.

But let me be quite understood by my junior readers; such an operation at an early period of gestation is not without danger, and requires delicacy, gentleness, and tact: to have recourse to it in any but extreme cases would be unpardonable rashness; but I should deem it just as wrong to allow a patient to die of hæmorrhage without having had recourse to it.

The *after-treatment* of patients who have miscarried requires great care. The popular belief is, that abortion is more dangerous than labour, and I am not sure that it is far wrong. No doubt exists that women are as liable to puerperal disease after abortion or premature labour as after delivery at the full time, and they require a more careful management than is generally adopted by them.

The patient should rest in bed the usual time, and then return gradually to her usual occupations. Attention should be paid to the lochia, that they be not checked, and to the bowels. The diet for some days should be bland and unstimulating.

The *prophylactic treatment* of abortion or premature labour requires, in the first place, the removal or avoidance of all possible causes; and secondly, the adoption of all means calculated to strengthen the constitution.

The state of the stomach and bowels must be carefully regulated, the diet be light and nutritious, and exercise taken in the open air, but not so as to occasion fatigue. If the patient be robust, the pulse full and quick, and some threatening symptoms present, a small bleeding may sometimes be useful; but if she be weak and cachectic, we must have recourse to tonics.

If the patient have previously miscarried, as she approaches again the same period, she must take absolute rest, lying on a sofa or bed, lightly covered, the greater part of the day, until the period be passed. Rest, more or less absolute, is one of the most powerful prophylactic means we possess, and in all such cases sexual intercourse should be prohibited from the period pregnancy is suspected, until after quickening.

Cold sponging, the use of the "*bidet,*" or cold bathing as recommended by Mr. White, of Manchester, is highly beneficial, provided we guard against too great a shock. In some cases I have seen a beneficial effect produced by daily syringing of the vagina with cold or nearly cold water, at the time of using the bidet or hip-bath.

When the habit of miscarrying has been acquired, one of the most effective means of breaking it, is to give the uterus a long rest, by separating the woman and her husband for several months.

PART III.

PHYSIOLOGY OF THE UTERUS. PARTURITION.

CHAPTER I.

CLASSIFICATION.—DEFINITIONS, ETC.

We have now arrived at the last great function of the uterine system—that of Parturition, with its abnormal variations.

It consists in the expulsion of the fœtus and its appendages from the cavity of the uterus, and ends in the separation of the child and the mother. It occurs, as we have seen already, at the end of nine calendar months and a week—ten lunar months—forty weeks—or 280 days, a few days being allowed either way.

The magnitude and importance of the event, and the regularity with which it takes place, have induced physiologists of all ages to assign causes for it, but as yet without success. Thus it has been supposed that the uterine action is excited by the struggles of the fœtus for want of adequate nourishment, or from the constraint of its position, or from the endeavour to breathe; by others it has been attributed to the acrid nature of the liquor amnii. Buffon has likened the process to the dropping of ripe fruit. Hervey, Burdach, and others attribute it to the uterus having attained its maximum of irritability at the exact time that the fœtal development is complete. It would be easy to fill pages with similar explanations, but these may suffice: they are all either more elaborate expressions of the fact, or mere hypotheses.

But though all search has hitherto failed in discovering the exciting cause of labour, it has established the fact, that the periodicity which we found to characterize the other uterine functions prevails here also. For example, abortion or premature labour, when not the result of external accidental causes, occurs very generally at a monthly—or what, but for conception, would have been a menstrual period.

Again, as remarked by Stark and others, the normal period for parturition corresponds to a menstrual period; on this principle Klugè calculates the duration of pregnancy in every case at 280 days, and so much more or less, as impregnation took place immediately before or after menstruation. Speaking generally, labour may be looked for at about the tenth period after the last appearance of the catamenia.

Lastly, in extra-uterine gestation, an attempt at labour occurs very generally at the same period. So that, taking the monthly discharge as the type of utero-ovarian periodicity, we may observe that it continues, though at times less demonstrably, throughout the whole period of the functional activity of the sexual system.

After a most ingenious and elaborate investigation, Dr. Tyler Smith considers that he has proved that "ovarian excitement is the law of parturition in all its forms of ova expulsion." "When the ovarium is severed from the rest of the sexual apparatus, as in the mammalia and human female, the ovarium is connected with the rest of the parturient canal by a series of reflex arcs. By means of the spinal excitor nerves of the ovaria, that portion of the spinal centre which presides over the actions of the uterus is, at the end of utero-gestation, thrown into a state of excitability or polarity, somewhat resembling the general spinal excitability of tetanus. It is curious that at this time, besides the ovarian excitement of the catamenial period which ushers in parturition, there is upon the surface of the ovarium the cicatrix (corpus luteum) left by the ovarian phenomena of conception, but which speedily disappears after delivery. The uterine nervi-motor system being thrown into such a state of persistent excitability, that the uterus firmly contracts equably upon its contents, the fœtus itself, hitherto defended by the liquor amnii, becomes an ordinary excitor, and the reflex actions of labour are gradually established. The equable contraction of the uterus preceding labour is, in effect, just as though the membranes had been punctured in the operation of inducing premature delivery, and the head of the fœtus brought to exert pressure upon the os and cervix uteri." Admitting that ovarian excitement thus excites uterine action, I do not think that Dr. Smith has satisfactorily explained the cause of that excitement occurring regularly at the tenth menstrual period rather than at any other.

Classification of Parturition.—The basis of all classification must be the definition of natural labour, inasmuch as the other classes and orders are but deviations from or complications of it; but upon this definition writers are much at variance. Some make the efficiency of the expulsive force the sole question, and include under natural labour, all such as are terminated by the natural powers. Thus Hippocrates, Smellie, Baudelocque, Rigby, &c. &c., include face, breech, and foot presentations in this class. Others conceive that the presentation ought to be taken into consideration, and therefore Denman, Blundell, Davis, Ashwell, Ramsbotham, &c. &c., limit natural labours to head presentations.

I prefer the latter arrangement, because I deem it better that what we take as natural labour, should present as nearly as possible a perfect type. Now the elements of labour are three:—1, the expulsive force; 2, the child or body to be expelled; and 3, the passages through which it is to be expelled. If these be equably adapted to each other, the natural objects of the labour will be attained—viz., the delivery of a living child with safety to the mother; and the labour may well be termed natural. But this result does not obtain except with head presentations, or at least not in anything like the same proportions, for in breech cases 1 in $3\frac{1}{3}$ are lost, and 1 in $2\frac{1}{3}$ in foot presentations, which is far more than when the head presents. This alone would, I conceive, be a valid reason for limiting natural labour to head presentations; not that the natural powers alone may not terminate the labour with other presentations, but that the average mortality is much higher.

Again, I think that the preponderating frequency of head presentations ought to have much weight in determining the most natural form of labour; and I find that in 327,802 cases the head presented 321,503 times, whereas breech presentations occur only once in $52\frac{1}{3}$ and footling cases once in $90\frac{1}{4}$ cases.

For these reasons, therefore, we shall include only head presentations under the term natural labour, and this will constitute the first great class of labours; the second will include deviations from it, in consequence of inequality or inefficiency in any one of the elementary conditions of parturition, such as inefficient force, defective passages, or abnormal presentations; each of these will constitute a subdivision into orders.

Besides these abnormal deviations from natural labour, there exist many which do not fall under any natural classification, but which may be grouped together as a series of complications, without any necessary relation to the character of the labour. So far then our arrangement will stand thus:

Class I. Natural labour.
Class II. Unnatural labour.
a. From abnormal condition of the expulsive force.
Order 1. Tedious labour.
2. Powerless labour.

b. From abnormal condition of the passages.
  3. Obstructed labour.
  4. Distortion of Pelvis.
c. From abnormal condition of the child.
  5. Malposition and malpresentations.
  6. Plural births. Monsters.
Class III. Complex labour.
Order 1. Prolapse of funis.
  2. Retention of the placenta.
  3. Flooding.
  4. Lacerations.
  5. Inversion of the uterus.
  6. Convulsions.
  7. Sudden death.

This arrangement is nearly the same as that given by Dr. Merriman in his valuable Synopsis of Difficult Parturition; and I think it will be found to include all the important deviations from natural labour. I have not made any distinction dependent upon the kind of assistance required in certain difficult labours (as, for instance, the "manual or instrumental labours" of some authors), but I shall interpolate the necessary chapters on operative midwifery, after treating of pelvic distortions; and add a chapter or two, in conclusion, on some of the more formidable diseases of child-bed or convalescence.

Presentations.—We understand by the presentation, that part which presents itself at the brim of the pelvis. Some writers, especially the French, enumerate a great variety of presentations, all of which, I think, may be advantageously included under four heads:

1. Presentations of the head.
2. „ „ breech, including the hips and loins.
3. „ „ inferior extremities, including the knees and feet.
4. „ „ superior extremities, including the shoulder, elbow, and hand.

Others, such as the back, belly, sides, &c., are so extremely rare, if they occur at all at the full term, that it would be superfluous to treat of them separately. Their practical management would be the same as for presentations of the shoulder or arm.

The following table will be sufficient to give some notion of their relative frequency in the practice of the same individuals:

Author.	Total No. of Cases.	Head presentations.	Breech presentations.	Inferior extremities.	Superior extremities.
Mad. Boivin . .	20,517	9,810	372	238	80
Mad. Lachapelle .	15,652	14,677	349	255	68
Dr. Jos. Clarke .	10,387	9,748	61	184	48
Dr. Merriman . .	2,947	2,735	78	40	19
Dr. Granville . .	640	619	2	3	1
Edin. Hospital . .	2,452	2,225	17	8	4
Dr. Maunsell . .	839	786	—	21	4
Mr. Gregory . .	691	645	14	7	4
Dr. Collins . . .	16,414	15,912	242	187	40
Dr. Beatty . . .	1,182	1,105	28	15	4
Mr. Lever . . .	4,666	4,266	59	29	12
Dr. Churchill . .	1,640	1,119	35	22	9
Drs. M'Clintock and Hardy .	6,634	5,815	140	61	26
Drs. Sinclair and Johnston .	13,748	11,874	309	181	60

The *diagnosis* of different presentations may be thus generally stated. The *head* may be known by its hardness, by the sutures and fontanelles.

The *breech*, by its softness, by the cleft between the buttocks, the anus, os coccygis, scrotum, or vulva.

The *knee*, by its rounded form, by the condyles of the femur.

The *foot*, by its long form, its being at right angles with the leg, the nearly equal length of the toes, the narrow heel, &c.

The *elbow*, by the olecranon process rendering the joint sharper than the knee.

The *hand*, by its shortness, the unequal length of the fingers, and the divarication of the thumb.

Positions.—The position is the relation which some part of the presentation bears to a given part of the pelvis: thus the positions of the head are determined by the relation of the fontanelles to the foramen ovale and sacro-iliac synchondroses; or, in more general terms, the position may be said to be the relation of the extreme points of certain diameters of the child to the extreme points of the pelvic diameters. These we shall examine in detail in the next chapter.

Stages of Labour.—For the convenience of description, it has been the practice to divide the process of labour into so many parts or stages, some make three, others four, five, or six: I shall content myself with three; the first extending from the commencement of labour to the passage of the head through the os uteri, the second terminated by the birth of the child, and the third occupied by the expulsion of the placenta.

CHAPTER II.

MECHANISM OF PARTURITION.

Before describing the phenomena of natural labour, it will be better to investigate the mechanism by which the expulsion of the child is effected, and with this view we shall first examine the elementary agents of parturition, separately, and afterwards their joint action. These primary conditions, or agents, are, 1, the expulsive force; 2, the passages; and 3, the child.

1. The Expulsive Force.—The uterus is in all cases the main agent in the expulsion of the fœtus, and in some, the sole power employed; as, for instance, when the death of the mother precedes the birth of the child; or when the mother is delivered in a state of syncope or asphyxia, as related by Haller and Henke; or in cases of prolapsus uteri, as mentioned by Wimmer, Chopart, &c.

We have heretofore seen that the uterus, if not muscular, possesses at least the character of muscularity, that it is composed of regular and irregular layers of fibres; at the time of labour these fibres contract, become shorter and thicker, and by their joint action diminish the size of the uterine cavity. The contractions are periodical, with distinct intervals, and each one is called "*a pain.*" They were so named, no doubt, from the suffering they occasion, but, in obstetric language, the term "pains" refers to the uterine action, and not to the suffering.

The contractions commence in the cervix, according to Müller, Michaelis, and Wigand, and there is reason to believe, some time previous to the beginning of real labour, and without suffering; for in most cases, at the commencement of labour, we find a slight degree of dilatation of the os uteri, without any complaint on the part of the patient. Dr. Murphy and others place the commencement of contraction in the fundus, from whence they extend to the cervix. Dr. A. S. Donkin has recently limited the contraction to the fundus and body throughout labour; the cervix being mechanically dilated.* After this unconscious uterine action has continued for a time, it is attended with pain, which marks the commencement of labour. The suffering increases with the increase of the pains. They are seated at first in the loins, and gradually extend round to the abdomen and down the thighs. From their acute, stinging character, these pains, which are limited to the first stage, are called "cutting or grinding pains:" during the second stage, the suffering is less acute, though not less severe, and the uterine contractions being aided by voluntary efforts, the pains are called "forcing or bearing-down pains." The former occasion the patient to cry out, but the outcries are suppressed during the second stage, from the necessity of holding the breath, to fix the chest as a "*point d'appui.*" The cause of the suffering is, first, the forcible distension of the cervix, next, the pressure of the fibres during contraction upon the nervous filaments, and lastly, the dilatation of the passages. The amount of suffering depends a good deal upon the temperament of the patient, and upon her habits of life; among savages and in hot climates it appears slight, but it is excessive in civilized life.

Each uterine contraction has a peculiar character; slight at first, it gradually increases until it arrives at its maximum of force, remains stationary for a short time, and then quickly subsides: and this is characteristic of the entire labour; for the pains which are slight at first, go on increasing in frequency and force, until, having arrived at the maximum degree of power, all obstacles yield before them, and delivery is accomplished.

Another remarkable peculiarity is their periodicity; each pain is followed by a distinct interval of rest and ease, diminishing as the labour advances, but in a regular manner. M. Saccombe has given an exact record of the frequency and duration of the pains, in one case, which I shall extract.† Between 10 and 11 o'clock, A.M., the patient had seven pains, and from 11 A.M. to mid-day eleven pains, as follows:

From the			minutes		seconds
1st pain to the	2nd	the interval was	15	and its duration	21
2 ,,	3	,,	14	,,	27
3 ,,	4	,,	10	,,	27
4 ,,	5	,,	8	,,	29
5 ,,	6	,,	7	,,	32

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* Ed. Med. Journal, Dec., 1863.

† Elémens de la Science des Accouchemens, p. 202.

From the				minutes		seconds
6th pain	to the	7th	the interval was	6	and its duration	35
7	,,	8	,,	6	,,	36
8	,,	9	,,	6	,,	40
9	,,	10	,,	6	,,	42
10	,,	11	,,	5	,,	45
11	,,	12	,,	6	,,	45
12	,,	13	,,	5	,,	47
13	,,	14	,,	5	,,	49
14	,,	15	,,	5	,,	55
15	,,	16	,,	4	,,	1′ 2
16	,,	17	,,	4	,,	1′ 10
17	,,	18	,,	4	,,	1′ 27
18	,,	19	,,	4	,,	1′ 33

At this period the waters escaped, and the head was soon expelled. M. Saccombe remarks that, "it results from this observation:—1. That the interval between the pains is in inverse ratio to their duration. 2. That the duration of each pain is in direct ratio to its intensity; that is to say, in proportion as the interval between the pains gradually diminishes, so does their duration increase, and in proportion as their duration increases, so does their intensity." The same conclusions equally apply to the severer pains of the second stage.

The pains, as I have already said, commence in the cervix, and gradually involve both the body and fundus; their first effect, as Wigand has observed, being to elevate, as it were, the presenting part, and afterwards to force it down. During the pain, the uterus becomes hard, round, and prominent, with the fundus tilted forwards; when the pain subsides, it softens, but does not quite recover its former flaccidity. It is impossible to estimate exactly the amount of force exerted by the uterus; it is always in proportion to the resistance, although the mode in which it is exerted varies; in some cases, it overcomes the obstacles by rapid and energetic pains, in other cases, the same end is attained by a longer and slower process.

The first stage of labour is completed by the uterine action alone, but during the second stage it is aided by the voluntary muscles, especially those of the abdomen, which press directly upon the uterus, and by the depression of the diaphragm, which diminishes the cavity of the abdomen. The additional effort made during the second stage is owing to the increased amount of resistance to be overcome. Towards the termination of labour, expulsive efforts are made by the vagina, and these are still more evident in the extrusion of the placenta.

Uterine action is not directly subject to the control of the will, although mental emotions exert a considerable influence upon it. For instance, labour may be brought on by mental excitement; and, on the other hand, anger, fear, surprise, &c., may suspend the pains. Betschler relates a case where the labour was arrested by the fright occasioned by a violent storm, and many of my readers are familiar with the case related by Baudelocque, in which the pains ceased each time that the pupils who were to witness the case came in sight of the patient. A temporary suspension of labour on the arrival of the accoucheur (especially if sudden and unexpected) is a very common occurrence. I have spoken of the voluntary exertions made during the second stage of labour: these, it is true, are at first under the command of the will, but at a more advanced period it is scarcely possible for the patient to withhold the co-operation of these muscles.

Dr. Tyler Smith thus sums up the motor actions of the uterus: "Volition may be said to affect the process only indirectly. Emotion has a direct influence, but it is accessory rather than essential to its performance. Reflex action is the great physiological power, which being absent, the function of parturition could not be properly performed. Peristaltic, or immediate action, is the basis or radical element upon which the other causes of motor action operate."*

2. THE PASSAGES.—Let me recall in a few words to the reader's recollection the diameters of the pelvis: those of the *brim* being —the antero-posterior, 4 to 4½ inches, the transverse, 5¼ inches, and the oblique, 4¾ to 5 inches; the relative proportion of these gradually changes in the *cavity*, until at the *lower outlet* the transverse is 4 inches, and the antero-posterior 5; in other words, that which was the longer at the upper outlet, is the shorter at the lower. From these diameters a deduction of a quarter of an inch in the antero-posterior, and half an inch in the transverse diameters, must be made, on account of the soft tissues clothing the pelvis.

I also remarked before, the great changes in the axes of the pelvis, which form an obtuse angle with each other, that of the brim looking upwards and forwards, and that of the outlet downwards and forwards. Lastly, I pointed out, as an important mechanical agency, the inclined planes of the cavity of the pelvis, the direction of which is downwards and forwards.

Now what mechanical effects are these peculiarities calculated to produce upon the passage of the fœtal head? 1. It is evident that as certain diameters only of the child's head correspond to certain others of the pelvis, the gradual change in these must be followed by a similar change in the *position* of the head; because the expulsive force presses the head forwards, and it *can* only advance by making this adaptation. 2. The change in the direction of the axes, and the effect of the inclined planes, more especially of the curve of the sacrum, must necessarily effect a change in the *direction* in which the fœtal head moves; in fact, they alter it from that of the axis of the brim to that of the outlet.

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* Parturition and Obstetrics, p. 48.

But in order that this adjustment of position and alteration of diameter may be effected, two things are necessary—first, that the pains should continue (with intervals), and, secondly, that the fœtal head should correspond to the size of the pelvis; for if it be too small, it will want the due resistance, and may be driven through the pelvis irregularly; and if it be too large, it will not pass at all.

Our estimate of the passages, however, would be incomplete, if we did not regard the uterine cavity as forming one extremity of them. The long axis of the child's body is almost always in accordance with the long axis of the uterus; but previous to labour the latter is not in accordance with the axis of the brim, but rather more perpendicular: the uterine contractions, however, remedy this by tilting the fundus uteri forwards, and so place the child in the right line of direction for entering the pelvis.

Having said thus much of the passages generally, let us endeavour to estimate the *obstacles* which the head meets in its progress: the *first* of these is the *cervix uteri*. The resistance it offers appears to be the effect partly of muscular action and partly of its elastic cellular tissue; but, as Dr. Murphy has observed, more generally of the latter than the former, unless there be much irritation. The dilatation is evidently in the first instance purely mechanical, and effected by repeated efforts, rather than by great force at one time, but afterwards the dilatation is aided by muscular action. This will be rendered clear by considering the process more in detail. During the last few weeks of gestation, the cervix becomes slightly softened and dilated, and the result of the first pains which retract or elevate the child, is to press down a pouch of membranes filled with liquor amnii ("the bag of the waters"). This forms a firm, equable wedge, adapted to any size or form of os uteri, and which, as the uterine fibres of the body and fundus are stronger than those of the cervix, must be forced down into and through the os uteri with each pain, dilating it to the size of the wedge thus formed, and continuing the process until the membranes give way. So far, all is mere mechanical dilatation, but if a prolonged and careful examination be made, when the child's head is substituted for the wedge of membranes, it will be found that the contractions of the fibres of the cervix which at first narrow the os uteri, do at length retract it over the head more and more each time, until, at length, the combined retraction of the cervix and propulsion of the head, force the latter altogether through the os uteri. This is particularly ascertainable in certain cases, when the anterior lip is unusually long in dilating. Besides the effective way in which this arrangement attains its object, it has other advantages; the os uteri is dilated by the bag of the waters with far less pain than by the fœtal head.

The *second obstacle* is the bony circle of the brim of the pelvis, into which the head can only pass by the adaptation of certain of its diameters to those of the pelvis, and even then the apposition is so exact that it requires a degree of compression, or "moulding" of the head, to facilitate its entrance. This is further aided by the head being placed obliquely in every way, and it is at length effected by repeated pains. When this moulding is completed, and the due position attained, the head is gradually propelled into and through the cavity, receding somewhat after each pain, and again advancing in a somewhat spiral direction, until it arrives at the *third obstacle*, or lower outlet, closed in by ligaments, muscles, cellular tissue, &c., and external to these the perineum. These tissues resist long, and their dilatation is very painful; they are first softened by mucous discharge, and then relaxed (how I know not), long before there is direct pressure upon them: afterwards, they are subject to alternate pressure by the head, and relaxation, until, being fully distended, they yield, and the head, directed forward by the curve of the sacrum, is applied directly to the vaginal orifice, and gradually, very gradually, forced through it. With first children the mucous membrane of the orifice of the vagina is more or less everted, and frequently torn posteriorly, without the injury extending to the perineum.

The amount of resistance varies in different subjects; it is greatest with first children, and, it is said, in women of advanced age, but I am not sure of this: I have always found labour more difficult with women of thirty-five than forty-five years of age; it is also greater in the second than in the first stage, but more rapidly overcome, owing to the greater force employed. The facility with which the head traverses the pelvis depends partly upon the force, partly upon the resistance, and partly upon the amount of compression which the head will bear: this is very considerable, though it is less practicable if the sutures be ossified.

These obstacles constitute the natural division of labour into stages, the first terminating when the os uteri ceases to impede the descent of the head, and the second with the passage of the child through the lower outlet, as already mentioned.

The length of each stage is of course in proportion to the resistance, and inversely to the power employed; but in natural labours it is as about 2 or 3 to 1 (at least in first labours), *i.e.*, if the whole labour be 12 hours, the first stage will probably be 8 or 9 hours; but, of course, this will vary much, and, within certain limits, without injury.

When, however, the entire labour is indefinitely prolonged, the relative proportion of the two stages is altogether destroyed, and either may be many times as long as the other. We shall speak of this by-and-by. Of the third stage (expulsion of the placenta) I shall treat under Natural Labour.

3. THE CHILD.—I have not much to add of the mechanical influence of the child in the process of labour, inasmuch as it is altogether passive. The measurements of the child's head are as follows:—

1. The longitudinal diameter from	4	to	4½	inches.
2. The transverse	3½	,,	4	,,
3. The occipito-mental or oblique .			5	,,
4. The cervico-bregmatic	4	,,	4½	,,
5. The trachelo-bregmatic	3½	,,	4	,,
6. The inter-auricular			3	,,
7. The fronto-mental			3½	,,

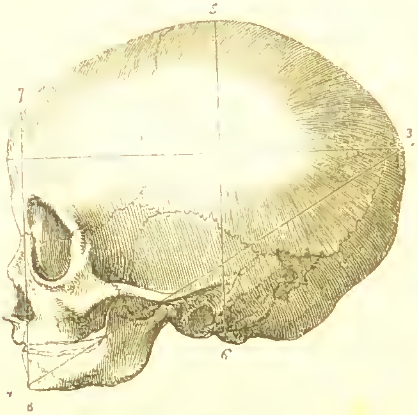
The first of these diameters corresponds to the oblique diameter of the brim and antero-posterior of the lower outlet; the second to the antero-posterior diameter of the brim and transverse of the lower outlet in ordinary cases; the third to the antero-posterior diameter of the lower outlet in face presentations; the others to certain diameters of the pelvis, to which the head is only transitorily applied.

The transverse diameter of the shoulders is from 4¾ to 5½ inches.
,, ,, ,, hips ,, 4 ,, 5 ,,

These diameters being at right angles with the long diameter of the head, it follows that when the latter corresponds to the longer (or antero-posterior) diameter of the outlet, they will be exactly in apposition with the long diameter of the brim.

The diameters are pretty regular in well-developed infants, and correspond very closely to those of the clothed pelvis. Yet certain adaptations facilitate the transit of the child—viz., the

Fig. 61.



(*From Maygrier.*)

compressibility of the head and body of the child, which it is calculated will permit it to be forced through a pelvis whose antero-posterior diameter at the brim is only three inches. And further, the head enters and passes through the pelvis obliquely, both as to its longitudinal and transverse axes, *i.e.*, one fontanelle and the anterior part of the presentation are lower than their opposites, thus diminishing the longitudinal transverse diameters from a quarter to half an inch.

This appears to be the proper place to notice some very interesting researches, published by Prof. Simpson, of Edinburgh,* on the different size of the head in male and female children, and the consequences which result to the mother and child. He states that the head of the male at birth is larger than that of the female, in its circumference, by $\frac{3}{8}$ths of an inch, in its transverse diameter $\frac{1}{8}$th, and in the inter-aural diameter by $\frac{2}{8}$ths of an inch. Now it appears from the following table, that the proportion of males is greater than that of females in some very important deviations from natural labour:—

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* Ed. Med. and Surg. Journal, Oct. 1844.

	Total Cases.	Males.	Females.	Proportion.
Tedious labour . .	119	65	54	148 to 101
Convulsions . . .	28	17	11	153 „ 100
Puerperal fever . .	88	54	34	161 „ „
Ruptured uterus . .	34	23	11	207 „ „
Hæmorrhage . . .	44	31	13	240 „ „
Forceps cases . . .	24	16	8	200 „ „
Crotchet cases . . .	74	50	24	200 „ „

From a large collection of facts bearing upon and illustrating the subject, the author has drawn the following conclusions of the dangers consequent upon this slight excess of size in male children.

1. Of the mothers that die under parturition and its immediate consequences, a much greater portion have given birth to male than female children. 2. Among labours presenting morbid complications and difficulties, the child is much oftener male than female. 3. Among the children of the mothers that die from labour or its consequences, a larger proportion of those that are still-born are male than female; and on the contrary, of those that are born alive, a larger proportion are female than male. 4. Of still-born children, a larger proportion are male than female. 5. Of the children that die during the actual progress of parturition, the number of males is much greater than the number of females. 6. Of those children born alive, more males than females are seen to suffer from the morbid states and injuries resulting from parturition. 7. More male than female children die in the earliest periods of infancy, and the disproportion between the mortality of the two sexes gradually diminishes from birth onwards until some time subsequently. 8. Of the children that die in utero and before the commencement of labour, as large a proportion are female as male. 9. In laborious labour with the head presenting, in proportion as the order of labour rises in difficulty, the amount of male births in them rises in number. 10. Of the morbid accidents that are liable to happen in connexion with the third (second) stage of labour, as many take place with female as with male births. 11. More dangers and deaths occur both to mothers and children in first than in subsequent labour. 12. The average duration of labour is longer with male than with female children. The long axis of the child in general corresponds to the long axis of the uterus, though occasionally it is somewhat oblique: this, according to Desormeaux, occurs once in

249 cases, according to Meckel once in 287, and to Osiander once in 300 cases.

Having now considered these elementary powers or conditions of labour separately, we are prepared to examine them in action; in other words, to ascertain the MECHANISM OF PARTURITION. Nothing can be more simple, but certainly nothing more erroneous, than the views held by the older writers on midwifery. They concluded that the head passed through the pelvis, in the same position as that in which it emerges from it—that is, with its long diameter antero-posteriorly. The first writer who corrected this opinion was Sir Fielding Ould, of this city, who wrote in 1742, and who stated that in the first part of its progress the face is turned to one side or other of the pelvis, "so as to have the chin directly on one of the shoulders." Dr. Smellie in 1752 corrected the error of Ould with regard to the contortion of the child's neck, but in other respects agreed with Sir F. Ould. Similar opinions were promulgated in 1770 by Deleurye in France, and subsequently by Schmitt and Mampe in Germany.

The next step in advance was made (without inter-communication) by Saxtorph of Copenhagen, and Solayres de Renhac of Montpellier, who in 1771 published two essays, which agreed in this fact, that the long diameter of the head of the child, in natural labour, entered the pelvis in a direction neither parallel to the conjugate, nor to the transverse diameters of the brim, but parallel to one of its oblique diameters; that is, with the sagittal suture running in a line directed at one extremity to the sacro-iliac synchondrosis behind, and to the foramen ovale anteriorly.* They further showed that of the two oblique diameters, the long axis of the head, in a very large proportion, occupied the left, or that running between the left foramen ovale and right sacro-iliac synchondrosis. M. Baudelocque adopted the opinions of his master, Solayres de Renhac, as the basis of his arrangement, and through his great influence the doctrine of the oblique position of the head has been generally diffused and received.

There were, however, many points which needed revision and correction; and for the full demonstration of that which was true, and the correction of that which was erroneous, with the addition of many new observations, we are indebted to the labours of Naegelè of Heidelberg, who in 1818 published his essay On the Mechanism of Parturition, which was translated into our language by Dr. Rigby in 1827. The more closely his opinions have been tested by experience and careful observation, the more clear does their correctness appear.

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* In speaking of right and left oblique diameters, I mean the right or left of the subject—not my right or left.

I would beg to refer my readers to a most elaborate treatise on this subject, by Dr. Leishman of Glasgow,* in which Naegelè's opinions undergo a searching criticism. Without quite agreeing with the author in some points, I cannot but allow great weight to his opinion, and I only regret that my limited space prevents my entering more fully into the subject.

Having so high an estimate of the labours of M. Naegelè, the reader will not be surprised at my adoption of his descriptions in the present volume; and it would give me great pleasure if, on my recommendation, all my readers would peruse his excellent essay.

We have already stated that the position of the head is the relation which its diameters bear to those of the brim of the pelvis; or, in other words, the situation of the extreme points of the longitudinal diameter of the head compared with the extreme points of the oblique diameter of the brim. Now the former are sufficiently well indicated by the anterior and posterior fontanelles, and the latter by the foramen ovale, right and left, and the sacro-iliac synchondrosis, right and left. Naegelè states that the child usually presents with the head in either of two positions corresponding to the two oblique diameters, but with the superior fontanelle at either extremity: thus those I have called 1st and 3rd, will belong to the left oblique, and the 2nd and 4th to the right oblique; but it is more convenient, with the majority of German and English modern writers, to make *four*, which therefore I have adopted. In the *first*, the posterior fontanelle corresponds to the left foramen ovale; in the *second*, to the right foramen ovale; in the *third*, to the right sacro-iliac synchondrosis; and in the *fourth*, to the left sacro-iliac synchondrosis; the anterior fontanelle of course corresponding to the opposite extreme of the oblique diameter.

These numbers do not correspond with those affixed to the presentations of other writers; but in order that no confusion may arise, I shall give a table of the corresponding numerals of different authors.

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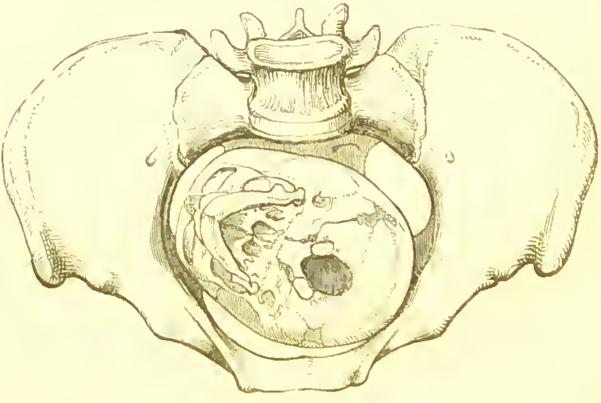
* An Essay, Historical and Critical, on the Mechanism of Parturition.

Numbers affixed to Presentation by						Description of Presentation.
Rigby.	Naegelè. Capuron. Maygrier. Dugès. Halmagrand.	Baudelocque. Dubois. Gardien. Davis. Dewees.	Lachapelle.	Boivin. Hamant. Moreau.	Ramsbotham.	Anterior part of Cranium pointing to
1	1	1	1	1	3	Right sacro-iliac synchondrosis.
	2	2	2	2	4	Left do.
2	3	4	3	4	6	Left foramen ovale.
	4	5	4	5	5	Right do.
		3		3	7	Promontory of sacrum.
		6		6	8	Symphysis pubis.
			5	7	1	Right os ilium.
			6	8	2	Left do.

Now let us trace the progress of the head in the different positions.

In the FIRST POSITION (fig. 62), it is, as I have stated, placed

Fig. 62.



(*From Moreau.*)

obliquely, corresponding to the right oblique diameter of the brim, the posterior fontanelle being towards the left foramen ovale or acetabulum, and the anterior towards the right sacro-iliac synchondrosis, the two fontanelles being at first on a level;

consequently the sagittal suture will run nearly in the left oblique diameter of the brim, but rather nearer to the sacrum than the pubis, because the anterior half of the presentation is almost always lower than the posterior. If the finger be at this time introduced into the centre of the os uteri, at the very commencement of labour, it will impinge upon the right tuber parietale, above which and on the upper edge of the parietal bone, the primary tumour is formed.

By the action of the uterus the head is forced downwards into the cavity, preserving in some cases merely the obliquity it possessed at the brim; but in other cases it assumes an oblique position as regards its longitudinal axis; one fontanelle—generally the posterior—being lower than the other; this is more remarkable as the head advances. In other respects, the position of the head and the presenting part is unaltered in the cavity, the posterior fontanelle still corresponding to the foramen avale, and not, as frequently stated, to the arch of the pubis.

When the head arrives at the lower outlet, Naegelè observes, "by continued pressure of the uterine contractions the posterior fontanelle gradually moves itself by slight degrees, repeated at equal intervals, in a direction from left to right (frequently more or less from above downwards), and the occipital bone advances from the side of the pelvis under the arch of the pubis. It is not, however, the centre of the occiput that advances under the pubal arch, but the head approaches the os externum with the posterior and superior part of the right parietal bone, and remains in this position until it has passed through the outlet of the pelvis with the greatest circumference which it opposes to it, when it then turns itself with the face completely towards the right thigh of the mother." That the head readily passes thus obliquely through even the external parts may be proved by tracing the sagittal suture, which will be found running obliquely from left to right, and by examining the tumour of the scalp, which, after delivery, occupies the posterior and superior quarter of the right parietal bone, and a portion of the occipital bone, if there has been sufficient delay at the vaginal orifice. Dr. Halahan,* though coinciding generally with Naegelè's conclusions, considers that the head is so placed at the beginning of labour, that the face looks forward; but that the fourth position changes at the beginning to the first, but the third does not change into the second until the head is distending the perineum.

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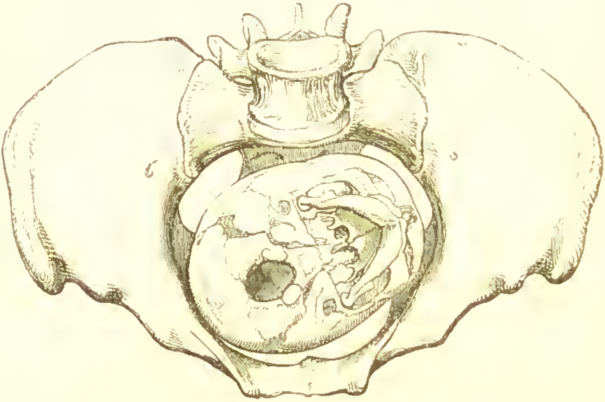
* Dublin Journal, May, 1862.

He considers this the general course, any other being exceptional.

When the head is in the SECOND POSITION (fig. 63), its longitudinal diameter corresponds to the left oblique diameter of the pelvis, and it is placed obliquely as in the former case, acquiring the second obliquity as it descends; and it passes through the pelvis and lower outlet precisely in the same mode as in the first position, only that the slight rotation is from right to left, and that when expelled it completes the quarter-turn, bringing the neck under the arch of the pubis.

Fig. 63.

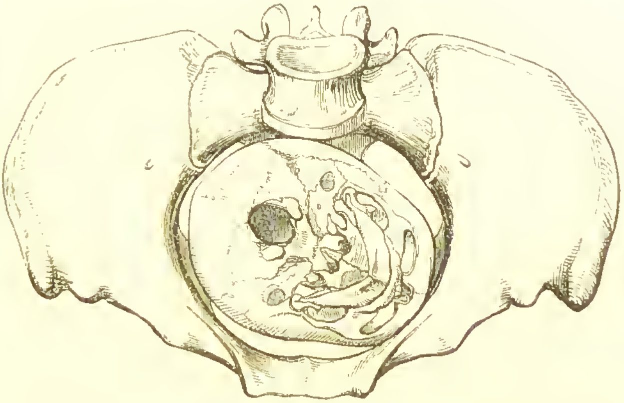


(*From Moreau.*)

In the THIRD POSITION (fig. 64), the anterior fontanelle corresponds to the left acetabulum, and the posterior to the right sacro-iliac synchondrosis, at nearly the same level, until the pressure occasions one or other (generally the posterior) to descend. The sagittal suture divides the os uteri obliquely and unequally, and the tumour of the scalp is found upon the upper edge of the left parietal bone, nearly at an equal distance from its angles, and the finger, passed in the central line, impinges upon it.

"As soon as the head is engaged in the cavity of the pelvis," Naegelè observes, "the great fontanelle turns towards the descending ramus of the left os ischium, and both can be felt at an equal height as to each other. As soon as the head experiences the resistance which the inferior part of the pelvic cavity opposes to it, or, in other words, the oblique surface which is formed by the lower end of the os sacrum by the os coccygis, the ischiatic ligaments, &c., by which it is compelled to move from its position backwards, in a direction forwards, it turns by degrees with

Fig. 64.

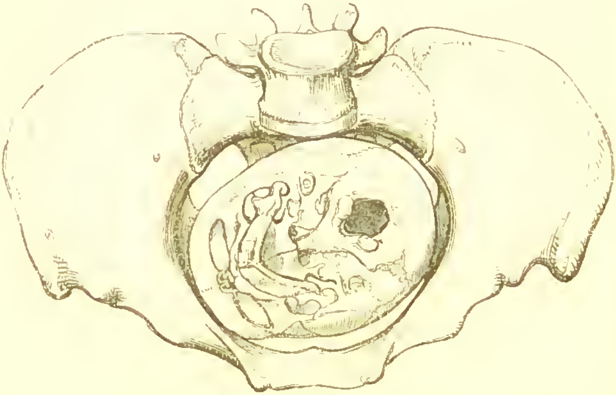


(*From Moreau.*)

its great diameter into the left oblique diameter of the pelvic cavity; *i.e.*, the posterior fontanelle is directed to the *right* foramen ovale, and as the head approaches nearer and nearer to the inferior aperture, it is the posterior and superior quarter of the left parietal bone, which is felt in the cavity of the pelvis, opposite to the pubal arch; so that when the point of the finger is introduced under and almost perpendicular to the symphysis pubis, it touches nearly the middle of the superior and posterior quarter of the left parietal bone; and this is precisely the part, as the head advances further, which first distends the labia, with which the head first enters the external passage, and the spot upon which the swelling of the integument forms itself." Thus, the head is changed from the third position into the second, and so passes out, the face, according to Naegelè, generally turning towards the left thigh of the mother.

In the FOURTH POSITION (fig. 65), the posterior fontanelle corresponds to the left sacro-iliac synchondrosis, and the anterior fontanelle to the right foramen ovale; and as the head is pressed through the cavity of the pelvis, changes analogous to those just described take place, but in the opposite direction—that is, the head is turned from left to right, so as to bring the posterior fontanelle towards the left foramen ovale; in other words, that as the head is changed from the third to the second position, so from the fourth it changes into the first. It then passes out, exactly as it did when presenting in the first position. The primary tumour will be at the upper edge of the right parietal bone; but the pressure of the lower outlet will extend it over the tuber, to the upper and back part of this bone.

Fig. 65.



(*From Moreau.*)

When the head presents in the third or fourth position, if the pelvis be unusually large, or the fœtal head unusually small, or even with a pelvis and head of ordinary proportions, if the pains come on very violently when the head is at the upper outlet, the changes into the second and first positions may not take place, owing to the absence of sufficient resistance or adequate time, but the head be driven through the pelvic cavity and lower outlet in the position (or nearly so) in which it presented at the brim, the upper and anterior part of the left (third position) or right (fourth position) parietal bone, and a portion of the superior part of the frontal of the same side corresponding to the arch of the pubis, and the posterior part of the right or left parietal bone, and part of the occipital, sweeping over the perineum. As the head passes out, the forehead looks upwards, under the arch of the pubis. Naegelè states, "Of ninety-six cases of the third vertex position, which I observed with particular care, and described in my note-book, I remarked the head *three times* to come through the external passages with the face upwards or forwards."

This occasions more suffering, and some delay, as the longitudinal diameter of the head is presented to the lower outlet without adaptation or modification.

Until very recently, the passage of the head with the forehead under the arch of the pubis was believed to be the ordinary termination of presentations in the third or fourth position; but since the publication of Naegelè's work has directed more careful attention to this point, abundant proof has been obtained "that what has been considered as a regular phenomenon is a deviation, and exactly that which has been esteemed a deviation from the usual course and rule is perfectly regular." Solayres de Renhac and W. I. Schmitt noticed the change from the third into the second position; but for the minute explanation we are indebted to M. Naegelè.

As to the comparative frequency of the four positions, there is no doubt of the greater predominance of the *first;* it occurred to Naegelè in the proportion of 69 per cent. of all his head presentations; to Madame Lachapelle in 77 per cent.; to Madame Boivin in 80 per cent., and to M. Halmagrand in the ratio of 74 per cent.

The *fourth* position is also confessedly the least frequent, occurring to M. Naegelè in the ratio of ·03 per cent.; to Lachapelle and Halmagrand in ·04 per cent.; and to Madame Boivin in ·05 per cent.

There is a great difference of statement, however, as to the comparative frequency of the *second* and *third* positions: thus Naegelè, in 1290 cases, only met with the *second* position in one instance, or in the proportion of ·07 per cent. M. Halmagrand describes it as occurring in 5 per cent.; Madame Boivin in 19 per cent.; and Madame Lachapelle in 21 per cent. On the other hand, Naegelè found 359 cases of the *third* position in 1210 cases, or 29 per cent.; while Madame Lachapelle gives only ·077 per cent. of such cases, and Madame Boivin only ·05. Dr. Simpson observed accurately the positions in 335 cases of cranial presentation, and found the first position in 256 cases, the second in 1, the third in 76, and the fourth in 2 cases. Dr. West, of Alford,* is of opinion that the second position is next to the first in frequency. Of 481 cases he found 306 in the first, 151 in the second, 15 in the third, and 9 in the fourth position. Dr. Swayne, of Bristol, found that in 286 cases, the first position occurred in 247; the second in 28; the third in 3; and the fourth in 8 cases.† Dr. Miller, of Louisville, found the fourth position more frequent than the third, and both less frequent than the second.

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* Glasgow Med. Journal. 1856.

† Prov. Med. and Surg. Journal.

It is extremely difficult to explain these discrepancies satisfactorily. M. Naegelè conceives that the examination was not made until after the change from the third into the second position had been effected; and he thinks that this opinion is confirmed by the fact that the frequency of the second position of authors agrees with the frequency with which he has observed the head to present in the third position. The researches of Dr. Breen, Professor Simpson, &c., have led them to coincide with Naegelè, and correctly so, in my opinion.

Diagnosis.—The diagnosis of the positions of the head is a matter of some difficulty, and requires delicacy of tact and experience; of course, the difficulty is greater before the os uteri is fully dilated. Naegelè has laid some stress upon the fact, that the movements of the child are felt more on one side than the other; so that when this happens on the right side, as is most frequent, we may presume the head to be in the *first* position, and when on the left side, in the *second*. That this observation is correct, my experience leads me to believe; but it affords no means of distinguishing between the first and fourth, nor between the second and third positions.

The stethoscope has also been called in to our aid, and in many instances the information it affords is conclusive. We cannot always distinguish a head from a breech presentation by it; but if by other means we can ascertain that the head presents, it is possible by this means to detect the position earlier than by any other. "Thus," M. Naegelè, jun., observes, "if, in a case of vertex presentation, the pulsations of the fœtal heart are distinctly heard in the left inferior abdominal region, diminishing in intensity as the ear leaves this part, but extending upwards and forwards, and continuing audible as far as the linea alba, or even beyond it, it may be presumed that the head occupies the first position. We are warranted in supposing that the head is situated in the second position, if the heart's pulsations are most distinctly heard in the right side of the abdomen."*

Careful observation of the movements of the child, and of the stethoscopic phenomena, have also led to the conclusion, that in some cases the child takes up its position at an early period, and does not change it till birth; whilst in other cases the changes are frequent, but diminish towards the eighth month. The fœtal heart will always be found to correspond with the motions of the child as felt by the mother.

We possess an unfailing test of the correctness of our diagnosis in the tumour of the scalp, or "caput succedaneum," as it has been called. It is formed by the pressure of the head against the openings through which it has to pass—*i.e.*, first against the circle of the os uteri, and secondly against the circumference of the vaginal orifice, and it always forms on the lowest or presenting part, so that the primary tumour indicates the part of the head which presented at the os uteri, and the primary and second together, that which occupied the lower orifice. The tumour itself consists most frequently of serum, sometimes with blood mixed, and in a few cases of blood alone.*

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* A Treatise on Obstetric Auscultation, translated by Dr. West, p. 71.

We have already seen that, in the first position, the primary tumour occupies the right tuber parietale, and the secondary, in addition, the posterior and superior angle of the parietal bone, with a part of the occipital bone; in the second position, it occupies the left tuber parietale primarily, and the posterior angle secondarily; in the third, the primary tumour is somewhat anterior to the left tuber parietale; but by the change to the second position the tuber and posterior part of the bone becomes the seat of the secondary tumour; and in the fourth, the primary tumour is anterior to the right tuber parietale, but the secondary tumour includes it and the posterior part of the bone.

CHAPTER III.

PARTURITION.—CLASS I. NATURAL LABOUR.

DEFINITION.—The term "natural labour" is applied to those cases in which the head presents, and descends regularly into the pelvis; where the process is uncomplicated, and concluded by the natural powers within twenty-four hours (each stage being of due proportion), with safety (as far as the labour is concerned), to the mother and child, and in which the placenta is expelled in due time.

Slight differences will be found in the definitions given by different authors; for instance, Dr. Power limits the time to six hours; Dr. Cooper to twelve; whilst Dr. Breen extends it to thirty hours. Dr. Burns also includes the fœtus having arrived at the full term; but these variations are of comparatively little importance. Within the limits I have laid down there will be found room for great diversity in the peculiar features of each case, and experience teaches us that scarcely any two labours are exactly alike. First labours are in general more tedious than subsequent ones, at least when the resistance is chiefly from the soft parts.

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* Churchill on Diseases of Children, p. 66.

The following table will show the proportional duration of labours :—

Authors.	Total No. of Cases.	Terminated in 6 hours.	In 12 hours.	In 18 hours.	In 24 hours.	Above 24 hours.
Dr. Merriman . .	500	206	398	442	450	
Dr. Collins . . .	15,850	13,012	15,084	15,346	15,586	264
Dr. Maunsell . .	839	347	647	734	793	36
Dr. Beatty . . .	1182	577	958	...	1114	69
Dr. Churchill . .	1285	366	760	...	1119	166
Dr. Granville . .	640	...	515	above 12 hours		104
Drs. M'Clintock and Hardy .	6634	3882	5280	5706	5852	269

In addition to these specific details, I may mention that Dr. Smellie calculated that 990 in 1000 are natural labours; Dr. Leake 900 in 1000; Dr. Bland found 1792 cases of natural labour in 1897 cases; Dr. Jos. Clarke 9748 in 10,199; Dr. Merriman 2607 in 2735; Dr. Lever 4266 in 4666; and Professor Assalini, out of 269 cases, reports 205 as "quick and easy."

It will be observed that I have inserted a parenthesis in the definition, to the effect that each stage should be in due proportion to the other (*i.e.*, the first to the second as 2 or 3 to 1), and this I have done to guard against the error of making time (or the *entire* duration of the labour) our sole standard, instead of symptoms; for a labour may be natural as to time (*i.e.*, completed within twenty-four hours), and yet if the first stage be very short (say one or two hours), and the second prolonged (say twenty hours), the character of the labour may be altogether changed, and the formidable symptoms of powerless labour be developed.

Precursory Symptoms.—Before describing the ordinary course of labour, it is necessary to point out certain symptoms which indicate its approach. These vary in intensity in different women: in some they are but slight, and may perhaps pass unnoticed; in others they are very well marked. The most important are,—1, the subsidence of the abdomen; 2, frequent micturition; 3, griping and tenesmus; 4, painless uterine contractions; and 5, mucous discharge from the vagina. Let us examine each of them briefly.

1. *Subsidence of the abdomen.*—We have heretofore seen that at the commencement of the ninth month the fundus uteri reaches to the ensiform cartilage; but that during the last month it subsides: this is especially remarkable during the last fortnight, and is sufficiently marked to attract the attention of the patient. The uterine tumour becomes apparently less, and sinks forward. It may probably be owing partly to the absorption of the liquor amnii, partly to the lower end of the uterus sinking into the pelvis, and partly to some relaxation of the uterine tissue permitting a greater amount of lateral expansion, and a consequent diminution in its height. The tilting forward is owing to a relaxation of the abdominal parietes, and increases in successive pregnancies: sometimes, though rarely, it is so excessive as to require the support of a bandage, and even to retard the first stage of labour by deranging the axis of the uterus.

2. *Frequent micturition.*—In proportion to the enlargement of the uterus, is the pressure exercised by it upon the neighbouring viscera. During the last month, when it sinks down into the pelvis, and falls forward, the pressure upon the bladder is considerable, and its capacity is so much diminished as to render a frequent evacuation of its contents necessary. In addition, there is a certain reflex influence from the uterus to the bladder, and an increase of irritability in the latter, on account of which it is less tolerant of the presence of urine than under ordinary circumstances. Its value as a sign of approaching labour, however, is lessened by the fact that it occurs from the same causes, just before the uterus rises out of the pelvis, and that it may be present during several weeks in the latter part of gestation.

3. *Griping, tenesmus, or diarrhœa.*—Similar mechanical and reflex effects of advanced gestation to those just noticed, may be produced in the rectum and large intestines, and the result will be an irritable state of the bowels, occasional griping pains, and a desire to go to stool when but little is passed. It must ever be remembered that this frequent passing of a small quantity of fluid fæces is quite compatible with a great accumulation of fæcal matter above the seat of the irritation, and may often be relieved by a free evacuation. It is an uncertain sign of the approach of labour.

4. *Painless uterine contractions.*—During the last month of gestation, and especially towards its termination, patients frequently notice a squeezing sensation in the abdomen, which lasts for a little time, then subsides, and is not attended with pain.

As was remarked by Leroux, if the hand be placed upon the abdomen, the uterus will be felt very hard, well defined, and tilted forwards. This partial contraction appears in some cases to be excited by the movements of the child. I have never observed it till towards the termination of pregnancy, except in cases of threatened abortion or premature delivery, and consequently I attach more value to it than to the previous signs. Velpeau states that the cervix uteri may also be felt alternately relaxed and contracted. It appears extremely probable that by this painless mechanism is effected that change in the cervix and os uteri which have been observed to take place previous to actual labour.

5. *Mucous discharge from the vagina.*—This is called "the shows" by nurses: it is generally observed about twenty-four hours previous to the commencement of actual labour, and evidently prepares the passages for the transit of the fœtus. The quantity and quality vary: sometimes the fluid is thin, in other cases thick and viscid (which Wigand says is more favourable), becoming thinner at the time of labour: some women have it profusely, others scantily. It is generally colourless until labour has set in; but during the dilatation of the os uteri, striæ of blood are mixed with it, arising from the rupture of some of the small vessels of the cervix uteri.

Of these precursory symptoms, it will be remarked, that the first and third only indicate an advanced period of gestation; the fourth, according to my experience, that labour is not far off; but the fifth is the only one which shows that it is close at hand. In addition to these more marked symptoms, many minor ones might be enumerated; such, for instance, as swelling of the labia and lower extremities, cramps in the thighs and legs, the improvement of the appetite and spirits, diminution of the dyspnœa, a sense of greater lightness and facility of walking, &c.; but these being unequal and uncertain, are therefore of less value.

Symptoms of Labour.—I shall now proceed to the description of labour in each stage; first detailing the phenomena, and afterwards prescribing the requisite management. Before I proceed, I should wish to impress upon my junior readers the extreme importance of carefully and minutely studying the subject of natural labour, not merely in books, which must necessarily be imperfect, but at the bedside of the patient. No case of labour, however simple, can be attended without some addition to our knowledge, if we are vigilant: almost all recent improvements in practice have arisen, and I believe nearly all future ones will arise, from a more perfect knowledge of the natural process, and a more correct appreciation of the natural powers. As I have already treated of the mechanical and vital agencies employed in effecting delivery, I shall now confine myself to a practical consideration of the results.

The commencement of labour is dated by the patient from the moment that the uterine contractions become painful, and correctly so, provided the entire uterus be engaged, if they recur regularly and continue without suspension. But this is not always the case; the uterus not unfrequently at first acts partially, irregularly, and inefficiently: such efforts are called "*false or spurious pains.*" They arise from various causes, such as over-fatigue, indigestion, constipation, cold, &c., and are occasionally excited by the motions of the child. A little careful observation will enable us to distinguish them from true pains, as they commence about the fundus, and are of limited extent, recur at regular intervals, are not attended with the mucous discharge from the vagina, and do not dilate the os uteri, or protrude the "bag of the waters:" on the other hand, true pains generally commence in the lower part of the uterus, and are first felt in the back, extending gradually to the front, recurring with regularity though increasing in frequency, dilating the os uteri, and protruding the membranes.

As these false pains may occur at any period of gestation, and sometimes bring on labour prematurely, or when at the full term occasion distress and loss of rest, and a long first stage, it is always desirable to relieve them: this may generally be done by rest, if the patient have been fatigued, or by aromatic purgatives, followed by an opiate, if the stomach and bowels are deranged, or by a full dose of opium alone.

The *true pains* recur at regular intervals, gradually increasing in frequency and power; and each pain from its commencement augments in intensity, until, having arrived at its maximum, it remains stationary for a short time, and then subsides; thus presenting, as it were, a type of the entire course of the pains.

The pains exhibit, however, different characteristics according to the stage of labour, and have therefore been divided into two kinds, "*cutting or grinding pains,*" and "*bearing down or forcing pains.*" The "cutting or grinding pains" are indicative of, and confined to, the first stage of labour, during the dilatation of the os uteri. They are short, severe, and not very frequent, obliging the patient to suspend her occupation, and partially arresting respiration, but not inducing any voluntary efforts. They are generally (but not always) seated in the back, gradually extending around the loins to the abdomen and thighs. The suffering they occasion is very considerable, and although (except in some irritable subjects) it is apparently less than that which accompanies the stronger pains of the second stage, yet it is much more difficult to bear, and the patient gives utterance to groans and loud outcries. The outcry which attends upon the cutting pains is an excellent diagnostic mark of the first stage of labour, and in some cases we are obliged to depend upon it alone.

During the *first stage* we generally find the patient more irritable and restless than subsequently, moving from one place to another, and changing both occupation and position frequently: she is low-spirited and fearful, weeping from dread rather than suffering, anticipating evil, and scarcely to be comforted. This distressing state disappears, however, as the labour advances. In some cases the despondency which has darkened the last few months of pregnancy is exchanged for cheerfulness and courage the moment labour sets in. In general I have remarked that, whatever the mental condition may have been during pregnancy, and even the first stage of labour, the violent pains, severe suffering, and hard work of the second stage, occupy the mind as well as body, to the exclusion of desponding anticipations, and, as it were, rouse up all the patient's energy and courage to meet the exigencies of the case. A singular deviation from mental integrity, apparently from extreme suffering, has been the subject of a valuable essay by Dr. Montgomery; I allude to the partial and temporary delirium which occurs occasionally, just as the head is passing through the os uteri or os externum. It seldom lasts more than a few minutes, and in one case I attended, the patient was conscious of talking incoherently, but felt quite unable to arrest herself.

During the first stage of labour, and especially at the time the head passes through the os uteri, severe rigors occur; not from cold, as they are observed equally when the patient is warm, but as the prelude to a pain. The surface is generally of the usual temperature, and free from perspiration, at least till near the end of the stage. The pulse is seldom permanently quickened until the second stage; although, as Hohl has remarked, if it be carefully examined, it will be found to become more frequent during the first part of a pain, then to remain stationary for a moment, and afterwards to subside.

During this stage also, the stomach is apt to become irritable, and discharge its contents, probably from sympathy with the uterus, rather than from mechanical pressure, as the abdominal muscles are as yet inactive. This is always beneficial, as it not only removes indigestible matters which may be in the stomach, but certainly relaxes the cervix uteri.

If the hand be placed upon the abdomen when the pains come on, the uterine tumour will be observed to contract, become hard, and tilt itself forward, so as ultimately to bring the axis of its cavity into complete accordance with that of the brim; and after remaining in this state for a longer or shorter time, it relaxes, but does not quite return to its pristine flaccidity.

The results of auscultation are very interesting; M. Hohl* thus describes them: "If we direct our attention to the changes of tone which the uterine pulsations present, we shall find them generally stronger, more distinct, and varied in tone during labour, and this is especially the case just before a pain comes on. Even if the patient wished to conceal her pains, this phenomenon, and more especially the rapidity of the beats, would enable us to ascertain the truth. The moment a pain begins, and even before the patient herself is aware of it, we hear a sudden short rushing sound, which appears to proceed from the liquor amnii, and to be partly produced by the movements of the child, which seems to anticipate the coming on of the contraction; nearly at the same moment all the tones of the arterial pulsations become stronger; other tones, which have not been heard before, and which are of a piping resonant character, now become audible, and seem to vibrate through the stethoscope, like the sound of a string which has been struck, and drawn tighter while in the act of vibrating. The whole tone of the uterine circulation rises in point of pitch. Shortly after this, viz., as the pain becomes stronger and more general, the uterine sound seems, as it were, to become more and more distant, until, at length, it becomes very dull, or altogether inaudible. But as soon as the pain has reached its height, and gradually declines, the sound is again heard as full as at the beginning of the pain, and resumes its former tone, which, in the intervals between the pains, is as it was during pregnancy, but somewhat louder."

An *internal* or *vaginal* examination reveals to us the condition of the passages, the state of the os uteri, and the rate of progress. At an early period the vagina will be found cool, moist or dry, and undilated, of nearly the calibre it was before labour commenced; as it advances, however, even during the first stage, the entire canal becomes more flaccid, and if not dilated, at least relaxed and dilatable. The os uteri is high up, but not always in the same situation; in first labours it is nearer to the promontory of the sacrum than to the symphysis pubis; in subsequent confinements this is often reversed. The lips of the orifice are sometimes soft and thick, in other cases hard and thin; the former dilate more readily, and the latter generally become softer and thicker, before dilatation takes place. At the commencement of labour the orifice will readily admit the point of the forefinger, and by the repeated pains it is gradually widened, so as to allow the child to pass. The rate of dilatation is slowest at the beginning; it is said, and I believe truly, to take as much, or more time to dilate the os uteri to the size of half-a-crown, than to complete the process; and for a very evident reason—viz., the want of a mechanical dilating force, the bag of the waters not being protruded until some progress has been made. If the finger be maintained in the orifice during a pain, we feel the circle tighten and become hard, until the head is pressing through the cervix; after which time the lips are retracted by each contraction. We ascertain the progress of the labour by carefully estimating the advance made by each pain.

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* Die geburtshülfliche Exploration, part i. sect. 105.

Towards the end of the first stage, or at the time when the os uteri is pretty well dilated, we remark an increase of the sanguineous striæ in the vaginal discharge, and the accession of voluntary efforts, slight at first, but gradually increasing. About this time generally, the membranes give way, the liquor amnii escapes, and by the next pain the head is forced through the os uteri, and enters upon the *second stage*.

The phenomena are now somewhat changed, especially in their intensity. The pains are more frequent and longer, the intervals shorter, and the suffering greater in general; but owing to the necessity of fixing the chest as a fulcrum for muscular exertion, the breath is suspended during a pain, and the outcry suppressed, except at its termination. The character of the outcry is therefore as good a test of the second stage as of the first. At the accession of each pain the patient holds her breath, and seizing hold of something with her hands, brings the muscles of the extremities, of the back and abdomen, to aid the expulsive efforts of the uterus. These are the "bearing-down pains" of the second stage.

It is not easy to explain the change in the character of the pains, nor why straining should occur only in the second stage. Wigand attributes it to sympathy between the os uteri and vagina, and between the abdominal and other muscles. It certainly cannot be merely owing to the presence of the fœtal head in the vagina. No doubt the increased resistance, and the necessity for more power to overcome it, is the final cause, though we cannot thus explain the immediate change, which I believe to be a reflex action, due to pressure upon the lips of the os uteri, and soft parts of the cavity and outlet, as the same effect may often be produced by pressure with the finger, just as we may double the strength of the pains by pressure upon the edge of the perineum, at a later period.

Further, the arrest of the circulation, from the suspension of respiration, distends the cutaneous vessels, the surface becomes florid, the face almost purple, the veins of the forehead, temples, and neck are distended, and the eyes are bright and prominent; the heat of the skin is greatly increased, and a profuse perspiration ensues. The pulse, which was quiet during the first stage, or at most quickened during a pain, is now increased in frequency during an interval, and the changes noticed by Hohl are very remarkable during the pains; *i.e.*, it becomes more frequent at the setting in of each pain, until it attains its maximum rapidity, at which it remains for a short time stationary, and then subsides. At the termination of the second stage it will generally be found to range between ninety and one hundred and twenty beats in a minute.

The effects of this arrest of respiration and forcible bearing down are sometimes very injurious. Dr. Blundell mentions having seen a case of general emphysema during labour, which he thinks is owing to a rupture of the smaller air tubes. A similar case is reported by Dr. Abbot, in which the whole face, neck, and chest, were emphysematous. It subsided, eight or nine days after labour, without any unpleasant consequences.

Vomiting also frequently occurs; but in the second stage it is as much the result of pressure as of reflex irritation, and it is generally favourable, as it seems to relax the soft parts. However, as it is a symptom developed also in unfavourable cases, it may be well to observe, that it may reasonably excite uneasiness when it comes on with symptoms of collapse (during this stage), after the sudden cessation of uterine action; when symptoms of fever, such as rapid pulse, furred tongue, heat of skin, &c., are present; when it is accompanied by abdominal tenderness; and especially if the fluid be sanguineous or dark-coloured.

If the second stage be prolonged, the patient often feels heavy and sleepy, and may doze between the pains; the result of the fatigue, combined with the congestion about the face and head. Under ordinary circumstances this need excite no uneasiness, as the patient is refreshed by it; but if it be excessive, and accompanied with headache, especially in primiparæ, we must be watchful, and on our guard against an attack of convulsions.

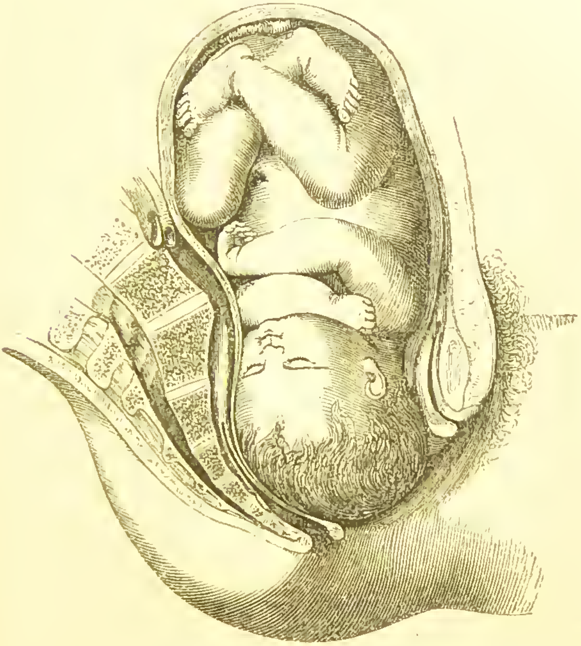
As the head advances through the pelvis, it presses more or less upon the nerves which pass through that cavity to the lower extremities, and gives rise to spasms and cramps, which add to the suffering of the patient. They may be partially relieved by friction. The pressure of the head also evacuates the contents of the rectum, but effectually prevents the emptying of the bladder.

If an *internal* examination be made at the beginning of the second stage, we shall find the vagina dilatable, and as though it had been dilated, its walls rugous and flabby, and prepared to yield to the pressure of the head. The head itself will be perceived at the upper part of the pelvis, filling it more or less completely, descending with each pain, and receding at its conclusion; the advance exceeding the recession, and the excess marking the rate of progress of the labour. At a later period the head will be felt on the floor of the pelvis, where it meets with considerable resistance, but which is overcome by the mechanism already described: we observe here the same repeated advance and recession, the head each time propelled a little further than before, and often with a kind of spiral movement, until, after a time proportioned to the difference between the force employed and the resistance, the obstacles yield, and the head presses upon the perineum, which undergoes the same process of dilatation.

At this period of the labour, when the head is distending the perineum and dilating the external orifice, both the suffering and the exertion reach their maximum point; and yet it is beautiful to observe how cautiously (so to speak) and how securely the process is effected. Adequate expulsive force is called into action; and if it were continuous nothing could save the patient from injury; but each pain is just long enough to gain upon the advance made by its predecessor; and the head, detained for a few moments at its furthest point of advance, then recedes; and this is repeated until the perineum is completely softened, and the os externum dilated. Nor is this all; the resistance offered by the perineum carries the head forward, so that its lowest point (the tumour) shall press against the os externum, and by its increase as well as its propulsion so distend the orifice that by the time the perineum yields, it is sufficiently wide to secure the proper direction of the head in its transit.

At the latter part of the second stage, the pains are often what is called "double;" *i.e.*, they succeed each other so quickly, that a new one commences before the former has quite terminated. At length the force conquers all resistance, and with a throe of agony the head is expelled; after which there is a short rest, equal to two or three pains, then the uterine power is again exerted to expel the body of the child. The second stage is now completed; the suffering, which was intense, is exchanged for perfect ease, and the sense of relief is inexpressibly great. If the hand be placed on the abdomen, it will be found flabby, the uterus large, and moderately contracted.

Fig. 66.



(*From Moreau.*)

The *third stage* of labour includes the detachment and expulsion of the placenta. I believe that in the great majority of cases the pains that expel the child detach the after-birth which remains loose in the uterus, waiting for a pain which shall expel it. The interval which elapses after the expulsion of the child, before the uterus again actively contracts to expel the placenta, varies somewhat in different cases, apparently according to the fatigue that organ has undergone. Dr. Clarke found the average interval to be twenty minutes. Out of 654 cases which I have accurately noted in my own private practice, I find that in 468 the placenta was expelled in (within) five minutes; in 119 cases, within ten minutes; in 35, within fifteen minutes; in 16, within twenty minutes; and in 18 within half an hour. Where due attention has not been paid, the interval will be longer; but from the above data we may conclude that in natural labour the placenta is more or less detached by the concluding pains of the second stage of labour, that with proper management it will be almost immediately expelled, and that when left entirely alone it ought to be expelled within an hour or an hour and a half, so that when the interval exceeds this, the case fairly comes under the order of "retained placenta," of which I shall treat hereafter.

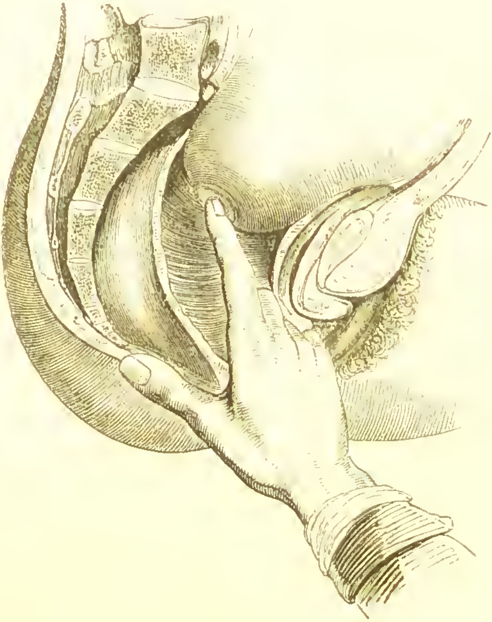
When this interval, whatever it be, has elapsed, the uterus again contracts, but much less forcibly, and by one or two pains, any connexion between the placenta and uterus is completely severed, the now useless appendage is extruded into the vagina, and by the contraction of this canal is expelled, with a gush of blood or clots (*dolores cruenti*). The bag of the membranes is generally turned inside out, especially if the after-birth have been extracted by pulling the cord, and the situation of the perforation in the membranes through which the child passed will enable us to estimate the distance of the placenta from the os uteri; the distance of the perforation from the placenta being exactly the same as the distance of the latter from the os uteri.

MANAGEMENT OF NATURAL LABOUR.—Let us now turn from the description of the phenomena of natural labour to a consideration of the duties of the attending accoucheur, and the mode of managing such cases. I have already stated that most of the modern improvements in midwifery have resulted from a more correct appreciation of the natural powers; so in the management of natural labour the great improvement has been the absence of interference. There is, in truth, but very little for the accoucheur *to do,* if the case be natural and the circumstances favourable, and very little that he needs, except patience and gentleness; and therefore the old practice of carrying certain instruments and certain medicines about with him is strongly to be deprecated, as, to say the least, a needless exposure of himself to temptation. All the surgical appliances needed are, an elastic gum-catheter (male) and a lancet; and, if in the country, a small quantity of laudanum, ergot, and tartar emetic. He ought also to be provided with a few strong pins, and some ligatures of twine or tape; and if there be a prospect of much delay, he will not be the worse of a book in his pocket. But to return; although there is little to do in a natural labour, we cannot of course *assume* that any case to which we may be called is of this class, without inquiry; our first object, then, when summoned to a patient, is to ascertain her *present state*, whether she be in labour or not, &c.; if she be, the *presentation* and *position* of the child, the *rate of progress* and *probable termination* of the labour.

As to the present state of the patient, a careful examination of the bodily functions generally, and of the pulse, tongue, skin, &c., will show whether the patient is in ordinary health, or whether we may have to contend with any complication, as fever or organic disease; and the information may enable us to anticipate, and perhaps prevent, some attacks. A more minute investigation must be instituted into the state of the uterine system, as to the presence of *true* pains; their frequency, force, and regularity; the character of the outcry, the amount of voluntary effort, the quantity and quality of vaginal discharge, &c. By these symptoms, we shall be able to form an opinion as to the existence of labour, the stage and rate of progress, and the preparedness of the passages, &c., and also as to the propriety of seeking for more special information, by means of a vaginal examination. This will add to the information previously acquired, a knowledge of the presentation and position.

It is not possible to fix a definite time for this examination; for in many cases it will depend upon the patient. It may, however, be stated generally, that it is satisfactory to make it as early as convenient, and that certainly no time should be lost after the escape of the waters, lest we miss the best opportunity for rectifying a mal-presentation. Further, the attendant should never leave his patient for more than a few minutes, unless he has ascertained that all is right. The frequency with which the examination should be repeated must depend chiefly upon the rate of progress. During the first stage (judging by the outcry and cool skin) it is scarcely necessary, if once we have ascertained that all is right; but during the second stage, it may be repeated according to the rapidity of the advance, every four, six, eight, or ten pains; and when once the head distends the perineum, the accoucheur should keep his finger upon the head during each pain, so as to regulate the support necessary for the perineum. To the junior student only can any directions as to the mode of making an examination be necessary, and they may be brief. The patient should lie upon her left side, with the hips near to the edge of the bed, and the knees drawn up towards the abdomen. The forefinger of the right hand (or two fingers, and in some cases those of the left hand) having been well oiled or soaped, should be passed along the perineum, and into the vaginal orifice; it is then to be directed upwards and backwards, towards the promontory of the sacrum, until the os uteri or the presenting part be found. Having done this, we shall be able to

Fig. 67.



(*From Dr. Ramsbotham.*)

estimate the calibre, heat and moisture of the vagina, the dilatability of the os uteri, the resiliency and general condition of the cervix, as well as the actual dilatation by the bag of the waters, or the fœtal head, during a pain. If the membranes be entire, an experienced finger will in most cases detect the presentation; if they have given way this will be much more easy and certain; and if it be the head, by finding the fontanelles and comparing their situation with certain parts of the pelvis, the position may be determined.

It is generally recommended to introduce the finger during a pain, as less unpleasant to the patient; but the examination must occupy both a pain and an interval, if we hope to obtain full information. A comparison of the knowledge thus obtained, with the frequency and force of the pains, will enable us to estimate the *rate of progress* of the labour; and these results, combined with the local and general condition of the patient, will afford adequate grounds for our *prognosis*. In conclusion, I would earnestly recommend to my junior readers to take every opportunity of passing the catheter and making vaginal examinations in the dead subject as well as the living.

We will now suppose that the conclusion from these investigations is favourable, that the patient is in good health, is really in labour, that the head presents, and that she is making a sufficiently rapid progress, with every prospect of a safe termination.

It is not necessary during the first stage, that the accoucheur should stay in the room with the patient, nor even in the house, if the progress be slow; before leaving her, however, he must be certain that all is right, that everything is in readiness; and he must give some general directions to the nurse. The patient is better out of bed during the early part of the labour, if it happen in the daytime, as she will be less fatigued, and probably less impatient than if she lay in bed the whole time; she may rest on the sofa when tired, and occasionally walk about, or pursue any slight occupation if she be able.

It is very desirable to keep her tranquil and cheerful, for which purpose she should be told of all that is favourable in her case, and all subjects calculated to depress her spirits should be avoided. In this matter much depends on the nurse, who should receive proper cautions. I am satisfied that in most, if not in all cases, it is better to deal frankly with our patient, and not to make false promises in hopes of encouraging her to bear the pains. Let her be told that all is favourable, and that, as far as we can judge, the labour will terminate safely for herself and her child, and she will bear to be told that she has yet some time to suffer. Moreover, as it is impossible to calculate with accuracy upon the duration of a labour, an assurance that it will be over in a certain time will, in all probability, issue in disappointment; and if so, in distrust either of our truth or skill. I have dwelt upon this the more, because nothing is more common than for the patient to beg of the attendant to say how long she will have to endure the pains.

During the first stage the patient may be allowed her usual diet, but without stimulants, as it is rather advantageous to have the stomach occupied. The bowels should be freed by medicine or enemata, if necessary, and the urine regularly evacuated; and it may be as well to put my junior readers on their guard against a frequent error of nurses, in confounding the dribbling of the liquor amnii, after the rupture of the membranes, with "passing water." I need not say that this may take place, and yet the patient suffer from retention of urine.

The patient should be cautioned against making any voluntary effort during the first stage; at least, until obliged by the increasing violence of the pains, as no effort can at this time hasten the labour. "Women," says Dr. Denman, "may be assured that the best state of mind they can be in at the time of labour is that of submission to the necessities of their situation; that those who are most patient actually suffer the least; that if they are resigned to their pains, it is impossible for them to do wrong, and that attention is far more frequently required to prevent hurry than to forward a labour." Neither is it necessary, as was formerly taught, for the accoucheur to endeavour to hasten the labour by manual dilatation of the os uteri or passages; such an "abominable custom," as Denman justly calls it, would rather have the effect of retarding the labour by the irritation it would occasion, and might, as in a case I witnessed, give rise to inflammation, and sloughing afterwards.

Among the matters which should be in readiness are two or three short pieces of tape or twine, for tying the navel string, a pair of scissors, some strong pins, and a binder. The latter should be made of a double of diaper, nearly half a yard wide, and long enough to go round the hips, and to allow for pinning over. These things ought to be provided by the nurse; but as labour sometimes occurs unexpectedly, or the nurse may be forgetful, it is well for the attendant to have a supply of twine and pins, with a pair of scissors, in his pocket-case. Towards the end of the first stage it is customary for the nurse to "make the bed," which is done by placing a skin of leather or a square of oiled silk over the under blanket and mattress, to protect them, at that part of the bed which will be occupied by the patient's hips; over this is placed the sheet, and upon this two or three sheets folded square, on which the patient is to be placed. These folded sheets will absorb most of the discharges, and can afterwards be removed without disturbing the patient, leaving dry bed-linen underneath. The skin or oiled silk is allowed to remain for some time longer.

Soon after the second stage of labour has set in, the patient (especially if she have borne children before) should undress, and go to bed. The position for delivery has varied in different times, and still varies in different countries. In the earliest times the sitting posture was preferred; and in Ambrose Paré, Deventer, and other old writers, we have a description and plates of labour-chairs, one of which the late Professor Hamilton used to exhibit to his class. In China and Cornwall the patient is delivered upon her knees, or leaning over something. In Darfour a pole is fixed across the room, which the patient holds with both her hands, and is delivered standing. In France, and some parts of Germany, the woman is placed upon her back, with the knees drawn up; but serious objections exist to either of these plans; by far the best and most natural position is the one now adopted almost universally in Great Britain and in many parts of the Continent—viz., on the left side, the hips being close to the edge of the bed, and the knees drawn up towards the abdomen. It is usual to place a pillow between the knees to keep them separate, but I cannot say that I think it essential. The patient's night-dress should be drawn up underneath her, above the hips, to escape soiling; and she may be allowed to grasp a sheet fastened to the bed-post, or, what is much better, the hand of an attendant. But, although I have advised that the patient should lie down soon after the commencement of the second stage, it is not necessary that she should remain in the one position the whole time, provided that the proper one be assumed before the head presses upon the perineum.

In most cases the liquor amnii escapes about the beginning of the second stage, but occasionally, when the membranes are unusually tough, they remain entire until the head has cleared the os uteri, or even, but more rarely, until it is passing through the os externum. When we are quite satisfied that the os uteri is sufficiently dilated for the head to pass, or that the head has passed through it, we may rupture the membranes by pressing the finger against them during a pain, as their integrity is an impediment to the advance of the child after this time; but it should not be done hastily, nor until we are certain that their usefulness is at an end. When the patient becomes hot, the bed-clothes should be lightened, and the room at all times be kept pleasantly cool and fresh. Food cannot be taken at an advanced period of the labour, but warm drink, such as whey, gruel, or tea, may be allowed, and the bladder should be emptied at intervals, until prevented by the pressure on the urethra.

When the head is on the floor of the pelvis, the accoucheur should take his place by the bedside, and examine gently during each pain for the purpose of deciding when it is necessary to support the perineum. The object in supporting the perineum is twofold; first, to afford a moderate counterpoise externally to the pressure exerted from within, so as to prevent the structures yielding under sudden or severe pains; and secondly, to prolong (as it were) the curve of the sacrum, and so make certain of the head being carried forward to the orifice of the vagina, instead of being forced through the perineum for want of such a direction forwards. Now to fulfil these two objects, it is clear that we need not interfere at all until the perineum is distended and protruding; but when we find this to be the case, then we should cover the left hand with a soft napkin, and apply the back of it along or across the perineum, commencing at the coccyx and reaching to the anterior edge. The amount of pressure needed is but little; no attempt must be made to retard the progress of the head; but whilst the perineum near the coccyx is firmly supported, and a direction forward impressed upon the head, the more anterior portion should be left free to yield before the pressure of the head. Neither is the skin to be retracted when the head presses through the orifice, but rather carried forward, so as to lessen the chance of laceration. Either hand may of course be used; I prefer the left, because it leaves the right at liberty to examine, and to receive the head of the child.

Let me repeat, that to make our assistance useful, and not injurious, the support should be moderate, equable, and rather firmer near the coccyx (but yielding as that bone yields), than towards the anterior edge; that it need not be afforded until the perineum protrudes; that then it should be afforded during each pain, and until the pain has entirely ceased. I really believe that it would be better not to touch the perineum than to make injudicious pressure; it has been my lot to witness more than one case where rupture was owing to excessive and injudicious support.

The reaction from the excessive and constant support of the perineum has led Dr. Tyler Smith, Dr. West of Alford, Dr. Swayne, Dr. Graily Hewitt, Dr. Leishman, and others, to object to any support being afforded. That it is not absolutely essential is probably true, but that when moderately exerted it is a great safeguard I have no doubt.

As the head passes through the vaginal orifice, the accoucheur should receive it into his right hand, allowing it to make the usual rotation, and carrying it forwards as the pains expel the shoulders and body of the child. The left hand must be employed in supporting the perineum as the shoulders press forward. When the head is expelled, the nurse should be directed to make firm, steady pressure upon the uterus, and to follow it down, keeping her hand upon it until the binder is applied; by so doing we shall rarely have any trouble or delay with the after-birth.

When the child is born, its mouth should be examined, and any mucus that may have accumulated in it removed. It not unfrequently happens that the funis is coiled around the child's neck, and fears have been expressed of its retarding the expulsion of the body, or causing the rupture of the cord, or the inversion of the uterus. These fears I believe to be unfounded, for extensive researches show that the funis is never twisted round the neck, unless it be beyond the ordinary length, and yet the ordinary length is sufficient to permit the birth of the child, after deducting the amount lost in the coiling. A very few cases are on record of cords so short (six or eight inches) as to require division before the child could be delivered; but in ordinary cases, if we find, on examination with the finger when the head has escaped, that the cord is twisted round the neck, all we need do is to draw down more of the cord, and slip the loop over the head or shoulders. If we cannot do this, we must loosen the cord as much as we can, so as to prevent the strangulation of its vessels, and then wait for the uterus to expel the child.

There is generally a short interval after the head is born before the pains expel the body, and it occasionally, though seldom, happens that this interval is prolonged, to the manifest risk of the child, whose face and head become livid and swollen, and it endeavours in vain to breathe. If it be allowed to remain thus, it will die of apoplexy; but, on the other hand, if we extract it hastily, without uterine action, there is danger of hæmorrhage. Under these circumstances, we have the choice of two evils, and must choose the least: the nurse should be directed to use friction over the uterus, and, if this fail in exciting it to action, she must make firm pressure on that organ, whilst the accoucheur takes hold of the child's head, and inserts a finger into the axilla, and gently extracts the body. The hæmorrhage may be prevented by pressure, but nothing can save the child but removal. I have repeatedly acted thus, and without any ill consequences.

If the child be healthy, and have not suffered from pressure, &c., it will cry as soon as it is born, and when respiration is established, it may be separated from its mother, rolled in flannel, and removed. This having been done, the hand should be placed upon the abdomen to ascertain (from the size of the uterus) whether there be twins; if not, we may proceed to apply the binder, which should embrace the hips inferiorly and the whole abdomen. It should be pinned firmly, but not too tight, and be kept on during the whole time the patient is in bed. I do not know that we can consider the binder *absolutely* necessary. Dr. Davis states that he has not used one for fifteen or twenty years, except in cases of flooding; and Mr. Kesteven has written an elaborate paper to disprove its necessity and to show that its supposed advantages have been exaggerated.* I cannot agree with these gentlemen, however, for I am satisfied that it is very useful, at first in maintaining a certain degree of contraction of the uterus, and giving support to the abdomen, and afterwards in promoting a return to the natural condition of the uterine and abdominal parietes: for which reason I think it deserving of rather more attention than is usually paid to it, at least after the first day or two. I believe that, if it be duly applied during the time the patient keeps her bed, she will avoid that loose state of the integuments, which gives rise to what is called "pendulous belly."

Before applying the binder, or immediately afterwards, the uterus should be firmly grasped, and firm pressure made in the direction of the axis of the brim. In most cases, as the placenta has been detached by the last pains, it will be felt to recede under the hand, and the afterbirth will be found in the vagina or in the bed. If not, the nurse should be directed to make pressure as soon as the binder is applied, and we should make firm but steady, and not excessive traction by the cord. I have adopted this practice for twenty years, and rarely have the placenta detained more than five minutes, nor have I had a case of hæmorrhage during that time. If we wait some time before making pressure, the uterus closes over the afterbirth, enough to retain it, but not enough to expel it.

After the placenta has been expelled or withdrawn, the binder may be tightened if necessary, and a warm napkin applied to the external parts. The soiled sheets underneath the patient may be removed, and the night-dress drawn down; but no further change should be made for two or three hours, as it is most important for the patient to avoid all exertion at this time. In some places and with some practitioners it is customary to give stimulants on the completion of labour; but as they are unnecessary in ordinary cases, they must be used very moderately. Rest and quiet are the best and only necessary restoratives. A still stronger objection exists in my mind against the practice of giving a dose of laudanum, unless specially called for, as it may suspend uterine action, and give rise to hæmorrhage. We may depend upon it that nature is fully equal to the emergency, and that the less we interfere the better for our patient; in the words of an eminent writer, "Meddlesome midwifery is bad."

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* Med. Gazette, Sept. 12, 1851. The binder is the subject of a paper in the Lancet, July 7, 1855, by Dr. Gilmour, of Liverpool.

Although our duties are now ended as far as the mother is concerned, we should allow some time to elapse before leaving the house, and before we go we should carefully examine the surface, pulse, uterine tumour, &c., and ascertain from the nurse the amount of discharge, so that we may be satisfied that all is right, or if wrong, that we may remedy it promptly. We ought also to visit the patient after six or eight hours, to see that the progress of the convalescence (to be presently described) is favourable.

Now let us return to the child: after waiting until respiration is fully established, or until the pulsation in the cord ceases, a ligature is to be placed upon the funis about two inches from the navel, and a second a few inches further on; and the cord divided between the two by the scissors. Some foreign writers object to the ligature as unnecessary, and the case of animals has been brought forward as a proof; but Dr. Hunter has shown that their mode of dividing the funis prevents hæmorrhage by the "torsion" exercised upon the vessels, and most practitioners of any standing must have met with cases where hæmorrhage occurred in spite of a ligature; so that in these countries the propriety of the practice is generally admitted. In former times, as we find from the writings of Johnson, Aitken, Whyte, and others, but one ligature was used; but on the authority of Denman, the second ligature was added to prevent mischief, if there should be a second child with a vascular communication (as sometimes happens) between the two placentæ. Dr. Dewees objects to this, on the ground that the loss of blood hastens the extrusion of the placenta; and Dr. Wood's* experiments so far confirm Dr. Dewees' opinions. The end of the funis should always be examined before the child is dressed, and if any oozing have occurred, an additional ligature must be applied nearer to the umbilicus. This fragment of the funis gradually dries up, withers, and falls off on the fifth or sixth day generally, though the time may vary from the second to the fifteenth day; and the surface contracts and cicatrizes. In some cases, however, the centre remains red, prominent, and moist, like a large granulation, with or without bleeding. I have found it cured easily by alum or nitrate of silver. In one case Dr. Simpson mentions† that the granulation increased to the size of a cherry, and was not relieved by caustics; he applied a ligature around its base, and it dropped off in a few days.

Thus far I have described the ordinary management of ordinary cases, both as regards mother and child; but there are not unfrequently slight deviations from this simple course, and some of them as regards the child must now be noticed. For instance, when born it may be in a state of *defective vitality, asphyxia,* or *apoplexy.*

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* Edinburgh Monthly Journal, June, 1849, p. 853.

† Ibid., July, 1847.

1. It may be in a state of *anæmia, syncope, or asphyxia,* from uterine hæmorrhage, too early detachment of the placenta, or defective nutrition. In these cases very feeble, if any, efforts at inspiration take place, there is no pulsation in the cord, and the action of the heart is very weak. There is consequently no object in preserving the utero-fœtal connexion; the funis should be tied and divided, and the child plunged into a warm bath: if this fail, cold affusion must be tried: but that which I have seen most effectual, is light and rapid friction of the body and extremities with warm flannel, with or without stimulants. Tickling the nose or fauces with a feather, electricity, and stimulating enemata, have been recommended; but I am not aware that they have been very successful. Inflation may be tried by means of a proper tube introduced into the larynx, or a flexible catheter passed through the nose, and with greater prospect of success than most of the other means. Great care must be taken to introduce the instrument cautiously and correctly, and to inflate slowly and gently. The "Marshall Hall" method has recently been successfully employed in these cases, and in all it ought to be tried, but I have found friction the most effective. In some cases, the infant, apparently healthy, is born dead, without anything in the nature of the labour to account for death; and in such cases, I have been led to believe, it may be owing to intra-uterine pressure upon the cord, perhaps from its being coiled round the body or limbs.

2. In other cases, the child may be in a state of *oppression or asphyxia* from prolonged labour, or from some deviation from the normal presentation, &c.; but in such instances the pulsations of the funis, though weak, are perceptible, the colour of the surface is natural, and the shape of the head is unaltered. Here it would evidently be wrong to divide the cord until respiration has been established; therefore, placing the infant in such a position that there shall be no impediment to the circulation through the cord, we must adopt some of the plans already mentioned for its restoration. Friction with hot flannel, warm baths, aspersion with cold water, stimulants to the surface, or inflation, may be in turn tried, until the child makes an effort to breathe. When it has fully recovered, the cord may be tied and divided. If these means fail, we may try the effect of loss of blood by cutting across the cord and allowing a dessert or table-spoonful of blood to

escape before applying the ligature. Should this not succeed, the case is hopeless.

3. There is a third class of cases where the child is threatened with or attacked by *apoplexy*, from prolonged labour, the pressure of a narrow pelvis, or (as already noticed) from an interval elapsing between the birth of the head and body. In such, the heart's action is laboured, the pulsation in the cord feeble and oppressed, the surface blue, the face livid, and in some cases the form of the head is changed. The treatment is exactly the opposite of that for the first class of cases; unless the circulation be relieved, the child will die of cerebral congestion or apoplexy; therefore the first thing to be done is to divide the cord, and allow from half an ounce to an ounce of blood to escape; after which we generally find the surface paler, the pulse quicker and firmer, and an effort made to respire; the cord may then be tied. If respiration do not take place, cold sprinkling, warm baths, friction or inflation may be tried.

Dr. Ogier Ward read an interesting paper before the Medico-Chirurgical Society, upon the immediate and more remote effects of compression of the head during parturition. To this he attributes symptoms of imperfect cerebral development and its consequences, epilepsy and paralysis. The remedy he considers to consist in establishing full respiration as soon as possible, during which the depressed portion of the skull may be observed to expand and assume its natural shape.*

I have only to add, that in all these cases we should not be easily discouraged, but continue our efforts for a considerable time, as we often succeed after a longer time than we should have believed possible.

The *tumour of the scalp*, already noticed, subsides in a very short time, without requiring any application in most instances; other cases, however, are not so tractable. The more simple tumours consist of serum effused underneath the scalp; others, of serum mixed with blood: again, in more rare cases, we find blood effused under the pericranium; and lastly, in addition to the blood effused, the pericranium appears to secrete a ridge of bony substance limiting the effusion. These *cephalhæmatomata*, which are very rare, are about the size of an almond, apparently not painful, and may be distinguished by their persisting for several days, and by the semicircular ridge or boundary, which can be felt by the finger.† No doubt they are frequently the result of pressure, but not always, as I have seen them form twenty-four hours after birth; and they do not disappear as do the other forms of tumour. Spirit or stimulating lotions may be used, and in some cases they will be successful; in others it will be necessary to lay open the tumour and apply simple dressings. The reader may consult upon this subject, essays by Wagstaffe, Gedding, Naegelè, &c., and the works of Osiander, Michaelis, Grœtzer, and Valleix.

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* Lancet, March 15, 1851.

† Churchill's Diseases of Children, p. 66.

The only remaining deviation from the normal condition of the infant which I shall notice, is *umbilical hæmorrhage*, either before, or much more frequently after, the separation of the remains of the navel string, and which is always very difficult to manage, and often fatal to the infant.

It is not of very frequent occurrence, which may be the reason why it has been omitted from most systematic works, or treated very slightly. However, increasing attention has been shown to it latterly, and we possess valuable papers on the subject by Radford,[*] Homans,[†] Ray,[‡] Bowditch,[§] Pout, Manley,[||] Bailey,[¶] Minot,[**] Willing,[††] and Smith.[‡‡]

It is remarkable that the majority of the cases on record were male infants, and also that in some cases there appeared something like an hereditary predisposition, two or three children of the same family having been attacked. Mr. Ray's case was the third male child (of the same mother) who had died of umbilical hæmorrhage, and he mentions having been informed of a family in which four male children died from the same cause. Out of thirty-two cases collected by Dr. Minot, twenty-two were males and ten females. He mentions one case, communicated by Dr. A. Hooker, of a woman who lost four children, and another who lost two, in this way.

The *causes* of this hæmorrhage are somewhat obscure; in some cases it seems to be owing to a defective ligature of the cord; but in others, and these are the more numerous, to causes more deeply seated. I think the cases, as far as our knowledge extends, may be classified as follows:

1. If violence be used to the remnant of the funis at any

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[*] Edin. Med. and Surg. Journal, July, 1832, p. 520.

[†] Boston Med. and Surg. Journ., July 11, 1849.

[‡] Med. Gazette, March, 1849.

[§] Amer. Journal of Med. Science, Jan. 1850, p. 63.

[||] Med. Gazette, May 3, 1850.

[¶] Amer. Journal of Med. Science, April, 1852, p. 432.

[**] Ibid., October, 1852, p. 318.

[††] Med. Times and Gazette, March 25, 1854.

[‡‡] Ibid., Nov. 3, 1855.

period before its decadence, it may give rise to hæmorrhage, as in the case recorded by Dr. Hill.*

2. If, when the remains of the funis fall off, the vessels have not undergone the process of closure and healing, a very alarming hæmorrhage may result, and one it may be impossible to arrest. Of this kind were Dr. Radford's and Mr. Willing's cases.

3. In a case which occurred in my own practice, about a fortnight after the child's birth, the navel became inflamed, a small collection of matter formed, and its spontaneous discharge was accompanied by a good deal of blood. When the abscess was empty, I succeeded fortunately in stopping the bleeding, by pressure and astringents.

4. Some of these cases seem to depend upon an unclosed state of the umbilical vessels, or defective hepatic ducts; although this does not invariably cause bleeding. An American physician, Dr. Anderson, of New York, has favoured me with an example, in which the ductus communis choledochus was imperforate, giving rise to jaundice and umbilical hæmorrhage. Dr. Minot mentions that in one case the gall ducts were wholly absent; in another the ductus communis terminated in a "cul-de-sac;" and in a third, it was closed by a plug of inspissated bile.

5. In a large proportion of cases, the hæmorrhage is accompanied by jaundice, whether dependent upon malformation or not, and certainly not always connected with organic disease of the liver; although Dr. Minot mentions that in three or four out of seven cases it presented deviations from the ordinary healthy appearance. It has been suggested by Dr. West,† and maintained by Drs. Bowditch, Homans, Bailey, Manley, and Minot, that the disposition to hæmorrhage from the navel may, and probably does, depend upon some morbid condition of the blood,‡ as shown by the disposition to hæmorrhage in other parts, analogous to what we see in adults. As Dr. Minot remarks, "the facts which I have collected lead me to think that idiopathic hæmorrhage from the umbilicus in young infants is only one of the various manifestations of the hæmorrhagic diathesis, which in other cases is exhibited in bleeding from the gums, mouth, stomach, intestines, &c., and in the appearance of the purpuric spots beneath the skin in various parts of the body. In proof of this we see the occurrence of these phenomena with umbilical

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* London Med. Gazette, vol. lii. p. 556.

† On Diseases of Infancy and Childhood.

‡ Campbell on Icterus Infantum. Northern Journal of Med., Aug. 1844. Adams, Amer. Journ. of Med. Science, April, 1851, p. 364.

hæmorrhage. Thus nothing is more common in the latter disease than a purpuric eruption. In three cases, there were bloody dejections; and in one, bleeding from the gums. Another argument is the thin and watery condition of the blood, and its deficiency in fibrine, whereby mechanical means become almost wholly inefficacious to arrest its flow."*

6. Finally, we have the cases which exhibit an hereditary tendency to hæmorrhage, as I have already mentioned, whether the proximate causes of the diathesis be malformation, organic disease, or an abnormal condition of the blood. It does not appear that the character or duration of the labour has any influence in the production of this accident. The labour was easy and natural in most cases.

Symptoms.—The period at which the hæmorrhage occurs varies from the third to the eighteenth day. In eleven cases, Dr. Bowditch found the average was seven days and three quarters; in Mr. Ray's case it came on the tenth day; in Mr. Bailey's, on the ninth and twelfth days. Of forty-one cases, Dr. Minot states that the average was the eighth day: in four cases it began before the separation of the cord; in three immediately after; in others at periods varying from one to thirteen days.

It is remarkable that most of the children seem to be healthy at birth, some few only appearing feeble. In some cases (nine out of thirty-nine, according to Dr. Minot) the hæmorrhage appeared without any previous symptoms; but in a large majority it was preceded by other symptoms, and principally by jaundice, with constipation and clay-coloured stools. In some rare cases, the child has appeared to be in pain, and in a few, cerebral symptoms have occurred. Upon the whole, however, there are but two prominent symptoms which are generally present—viz., the bleeding and the jaundice, and the latter, as I have stated, not always. Unless when the portion of the navel string is removed by violence, or some violence is applied to the umbilicus afterwards, the hæmorrhage is neither rapid nor projected in jets from any visible vessel, but rather a continuous weeping. Dr. Bowditch observes that "the funis drops off, and usually nothing abnormal is observed, or at most, only a delicate sponginess of the umbilicus. After three or four days an oozing commences, which either increases with every application, or perhaps is slightly checked by astringents, &c.; but it almost always proves fatal, and the patients before death become perfectly blanched. In these cases it is very common to observe an alteration in the structure and functions of the liver; the dejections being non-bilious, and at the *post-mortem* examination, disease of the hepatic structure, or of the ducts, being observed."*

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* Amer. Journ. of Med., Oct. 1852.

The character of the blood is ordinarily described as thin, and of unusually light colour, and in general it does not coagulate, so that we may conclude that it contains less fibrine than in health.

The most frequent termination is in death; in fact, almost all the cases terminate unfavourably; it may be at any period from the first day of hæmorrhage to the seventh or eighth, according to the rapidity or continuousness of the bleeding.

I have already alluded to the principal *post-mortem* revelations. One or more of the hepatic vessels may be defective or impervious, the duct of the gall-bladder may be impervious or obstructed, the liver may be congested, softened, or flaccid, and the blood thin, pale, and not coagulable. Or, in some few cases, we may detect none of these changes.

The *diagnosis* is of course quite easy, and the simultaneous occurrence of petechiæ, or ecchymosis, or hæmorrhage from the mucous membranes, will mark the case as belonging to the fifth class. From what I have said, the reader will gather that the *prognosis* is very unfavourable In spite of all our efforts, a very large proportion die, especially in the fourth, fifth, and sixth classes. Out of forty-six cases, Dr. Minot states that thirty-nine died at periods varying from six hours to six weeks from the commencement of the hæmorrhage.

Treatment.—In all cases, styptics or astringent remedies may be applied, and generally with some temporary relief. The best are, a solution of alum, sulphate of zinc or copper, infusion of matico, gallic acid, Ruspini's styptic, collodion, &c.

In the first and second classes, pressure has been frequently tried, and as frequently failed, from the softness and yielding of the abdomen. As a modification of pressure, I suggested filling the navel with plaster of Paris, in a fluid state, which, becoming instantly solid, and being held *in situ* by the inner folds of the umbilicus, would be likely to make firm pressure. I have never tried it myself, but I find that it has succeeded in at least one case. When compression fails, Dr. Radford proposes to cut down upon the umbilical vessels, and tie them; and it is a reasonable experiment, although it has failed. The ligature *en masse* is preferred by M. Paul Dubois, and he thus performs it:—A cushion is placed under the infant's loins, to render the abdomen prominent. The operator introduces horizontally from left to right a hare-lip pin, which pierces the integument at the base of the navel. By means of a loop of thread passed under this pin, he raises the integuments, and a second pin is introduced, perpendicularly to the first, and beneath it: the thread is then twisted several turns in a figure-of-eight shape, round each pin, and to complete the ligature the base of the umbilicus is encircled with waxed thread. The pins may be removed towards the fourth or fifth day, but nothing must be done to hasten the separation of the eschar, which must be left entirely to itself. In two cases in which M. Dubois adopted this plan, the bleeding was arrested, and did not return, but the children died. In Drs. Bowditch and Bailey's cases it was tried, and failed, the hæmorrhage returning. Dr. Brown is opposed to this plan, as likely to excite peritoneal inflammation, and so hasten death. Dr. Manley prefers it to cutting down upon and tying the vessels.

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* Amer. Journ. of Med. Science, Jan. 30, 1852, p. 64.

In the fourth, fifth, and sixth classes the same remedies may be tried, but there is less hope of success, as the hæmorrhage is not local, but dependent upon causes over which we have little or no control. Dr. Minot suggests the internal use of tonics and astringents, and I think with reason, treating the patient as we should a case of purpura, or hæmorrhage from the mucous membranes.

Mr. Ray and Dr. Bowditch suggest the employment of the actual cautery in these cases, nor do I see any objection to trying it in such hopeless cases, if other means fail. We must do all we can to keep up the strength by means of nourishment—milk, broth, wine and water, &c.

Thus it appears that our list of remedies comprises strong astringents, pressure, caustics, the actual cautery, and the ligature. Dr. Minot remarks, that of his cases, those in which the bleeding was permanently arrested, were by the following means: compression in three cases; ligature in three; collodion in one; plaster of Paris in one; scrapings of shoe leather in one, and nitrate of silver in one case. But although the bleeding was arrested, yet in several of these cases the infant died from exhaustion produced by it.

As *prophylactic treatment*, Mr. Ray suggests attention to the mother's health during gestation; abundance of healthy natural nourishment for the child after birth; and that in families where this accident has occurred, the accoucheur should daily superintend the dressing of the navel until it has quite healed, using collodion, styptics, or compression. Dr. M. S. Perry suggests the use of mineral acids during pregnancy, by women whose previous children have suffered from umbilical hæmorrhage.

This is probably the best place for me to introduce some notice of the employment of Anæsthetics in Midwifery, whether in natural labour, or in cases requiring operation.

The two sole agents in use now for the purpose of producing insensibility to pain, are ether and chloroform; but the latter has so far superseded the former, that I may confine my remarks to the use of chloroform.

To my friend Sir James Simpson belongs the credit of having been the first to administer ether during labour, and also of having discovered the value of chloroform as an anæsthetic, and of introducing it into practice. It is composed of two atoms of carbon, one of hydrogen, and three of chlorine; or one of formyle and three of chlorine, sp. gr. 1·480: it rapidly evaporates, and possesses an aromatic, pungent taste, and a fragrant smell. When inhaled, it gives rise to exceedingly pleasant sensations, and a rapid flow of thoughts and images, resembling a pleasing dream, until, as the dose is increased, these become confused and incoherent, previous to deep sleep being induced. The first stage is one of excitement, then follows calm sleep, and at length stupor; but the excitement is said to be less than when ether is used. The beneficial effect is the alleviation of pain, in consequence of, and in proportion to, the amount of insensibility, so that we possess the power of graduating its effects as we may deem advisable.

That injurious effects are occasionally produced, is no more than we should expect from so powerful an agent: that they have occurred in so very small a proportion may well excite our wonder. Many of the unpleasant symptoms are referrible to the nervous system, such as spasms, twitchings, convulsive movements, incoherent talking, &c. Several fatal cases of collapse have been recorded, and although some doubts have been entertained as to whether the death was caused by the chloroform, I fear the evidence is too clear. So far as I can judge, the mode of death is twofold; either a fatal syncope or a fatal asphyxia being induced. It is remarkable that in most of these cases, I believe, the chloroform was administered, not to relieve pain, but in anticipation of it, as for tooth-drawing, &c. It is of importance to remember that the pulse and respiration afford very accurate indications of the propriety of continuing the inhalation; we should stop instantly if we find the former becoming weak and the latter irregular. In Edinburgh, most reliance is placed upon the state of the respiration; any hesitation or failure demands the instant stoppage of the inhalation.

So much for the general use of chloroform; now let us see what has been the result of its employment in midwifery. It has been now used extensively in Great Britain, in America, and on the Continent, and we have an account of many thousand cases in which it has been employed. From this it appears,

1. That in midwifery practice no death has occurred which can be fairly and directly attributed to the chloroform when administered by medical men. In the cases brought forward by Dr. Gream and Dr. Ramsbotham, there is no evidence to prove that the deaths did not result from the circumstances of the labour, and no ground to atttribute the accident to this agent.

2. That some unpleasant symptoms have occurred in hysterical and nervous women during the stage of excitement, but no instance of the alarming or fatal collapse which has occurred in cases unconnected with pregnancy or parturition. These symptoms disappear in a few moments if the chloroform be discontinued, or, as is said, if the dose be increased.

3. In a small proportion of cases, the uterine contractions are weakened, rendered less frequent, or even suspended, so long as inhalation is continued, but that they return if the use of chloroform be discontinued.

4. In the great majority of cases it does not interfere with the labour pains, except by suspending all voluntary exertions, if the insensibility be complete. Where the dose given is milder, although great relief be afforded, the patient will not become insensible, and will be able to exert considerable force.

5. That chloroform, in full doses, is capable of entirely removing the pain of obstetrical operations, and thereby increasing the facility of their performance. Moreover, that the dose can be so graduated as to afford degrees of relief, so that, in natural labour, a certain amount of suffering may be spared without producing insensibility, or incurring the risk, whatever that be, of a full dose.

6. It neither prevents nor weakens the subsequent contractions of the uterus, and consequently does not render the patient more liable to flooding.

7. That certain women seem more obnoxious to its injurious effects than others, and in some these effects are said to continue some time. Giving full force to these cases, they appear to form a small part of a large number whose recovery was not retarded, and whose subsequent health was uninjured.

These inferences, I think, are fairly deducible from the published cases: whether, as has been asserted, many fatal or bad cases have occurred which have not been recorded, I cannot say; but until we know the particulars, it is clear that we can allow no weight to such a supposition. It is much to be regretted that so much personal and party feeling has entered into the publications on the subject, instead of a simple desire to discover in what cases this new agent is admissible, and in what it ought to be rejected, with the reasons for such decision.

It is right, however, to notice respectfully some of the objections which have been made by most experienced and conscientious practitioners.

1. The first objection I shall notice is, that as "in sorrow shalt thou bring forth children" was part of the original curse pronounced upon the sin of man, therefore any attempt to mitigate the suffering is a direct and unwarrantable interference with an ordinance of God. Now it will be remembered that labour ("in the sweat of thy brow"), pain, and death were equally the result of the same sin, and inflicted by the same Hand, and yet we never hear of the wickedness of lightening labour, of relieving pain, or of postponing death, each of which *must* be wrong, if relieving the suffering of childbirth be wrong. It is monstrous that one sex should claim the privilege of relief, and object to its being extended to the other. If further argument be needed, the reader may refer to Sir James Simpson's critical remarks upon the Hebrew word translated "labour."

2. It has been stated that, in operations, the loss of sensibility deprives the operator of a valuable indication as to whether he is inflicting injury or not. I do not see much force in this objection, I confess. If the operator be skilful, and habituated to the use of instruments, he will not do mischief because the patient does not cry out; and if he be not skilful, her crying out will not prevent him. I am sure that the patient being spared the shocking pain of most operations, and the operator the distress of witnessing it, is a blessing beyond price, and more than anything calculated to secure a safe and skilful performance, and in all probability a favourable convalescence.

3. Our ignorance of the bad consequences of chloroform, and of the cases improper for its exhibition, and the consequent probability of our complicating the labour by some serious accident voluntarily incurred, has been, and is yet, I think, an objection deserving of careful consideration. No doubt the increased and increasing number of facts recorded affords a ground for sound conclusions, in proportion to their extent; but it is still to be

desired that there should be a careful classification and minute investigation of those cases in which any unpleasant symptoms have occurred, with the object of discovering the circumstances, whatever they may be, which counter-indicate the employment of anæsthetic agents. Interruption of uterine action, diminution of uterine force, and affections of the nervous system, or of the heart, seem to be the chief evil effects to be feared in parturient women.

4. The probability of uterine hæmorrhage after labour was formerly much insisted upon, but I think experience has shown that this fear is groundless. It has not occurred more frequently in patients who have used chloroform than in others.*

Thus far I have given the inferences which appear to me to be fairly deducible from the cases on record, irrespective of the opinions of the various writers who have engaged in the controversy. The following practical conclusions may be regarded as my own opinions, formed after much thought and reading, and after some personal experience. I would not wish to put them forth dogmatically, for I do believe that we are not yet in a condition to define accurately, or to speak positively on the subject. I confess that I can neither agree with those who think that chloroform can do no evil, and therefore ought to be used in every case, nor yet with those who regard it as in all cases injurious, and therefore to be reprobated.

1. In most *obstetric operations*, anæsthesia appears to me to be of great use, not so much because it is supposed to relax the soft parts, or to moderate uterine action, as because it enables the patient to bear the additional pain we inflict without outcry, or movement, or shock. It surely must be a great advantage in performing a dangerous operation that the patient should lie still, and not by her struggles increase our difficulty, and the risk of injury to herself. If the tissues be relaxed, which is doubtful in many cases, it is of course an additional advantage; and if it happened in a case of turning that the uterine action were suspended, of course the operation would be all the more easily completed; but these are rather accidental advantages than essential consequences. In operative midwifery, therefore, chloroform may be given until anæsthesia is produced before commencing, and its effects may be kept up during the operation, *provided* that there be no counter-indication to its use, and no unpleasant symptoms arise; in either case it should be given up altogether. In a former edition of this work I excepted from the use of chloroform two classes of cases—viz., convulsions and hæmorrhage, more from a fear of its

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* British and Foreign Med.-Chir. Review, April, 1855, p. 359.

being injurious than from any evidence we had of its being so. Since then, the experience of Drs. Channing, Turner, Keith, Norris, Shekleton, &c., has shown that, so far from being mischievous in convulsions, it is most useful as a remedy.* And as to hæmorrhage I must add, that the fear I feel is one of anticipation, and not founded on experience. Sir James Simpson and others have administered it in placenta prævia, when there has been great loss, without any evil effects.

2. It may be administered with great advantage in certain cases, in which a thorough examination, with the hand introduced into the vagina, is necessary for determining upon the proper line of treatment; as in distortion, for instance, to enable us to determine whether the diameter of the brim is sufficient to enable a living or a mutilated child to pass, or whether we must have recourse to the crotchet or Cæsarian section. Under the influence of chloroform, we may compare the breadth of our hand across the knuckles with the brim of the pelvis, and arrive at a very accurate measurement, without pain to the patient. This Sir James Simpson tells me he has found very satisfactory.

3. As to its exhibition in *natural labour*, as I do not believe that in the large majority of cases convalescence is at all impeded by the suffering, I cannot see the *necessity*, or even the propriety, of urging the employment of anæsthesia in every case; and I do feel that even greater caution ought to be used than in operative midwifery. We may be justified in running some risk where an important point is to be gained, such as perfect quietness during an operation, which we should not be justified in incurring merely to relieve pain. Thus in hysterical or nervous patients, in those labouring under nervous affections, or organic disease of the lungs or heart, &c., I do not think we ought to employ it.

But on the other hand, as pain is undoubtedly an evil in itself, if there be no counter-indication, and if the suffering be either great or prolonged, I cannot see that we are prohibited from the employment of anæsthetics, more especially as it is not necessary in such cases to produce insensibility. It is quite possible to afford immense relief, to "render the pains quite bearable," as a patient of mine observed, by a dose which does not produce sleep or impair the mental condition of the patient, and which all our experience would show is absolutely free from danger. In my own practice I have never urged a patient to use chloroform in natural labour, and, on the other hand, I have not felt justified in refusing it when the patient urgently desired it, and none of the conditions were present which seemed to me to counter-indicate it.

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* See the Chapter on Convulsions.

The period at which it has been administered varies with different practitioners; some commence before the os uteri is dilated, others about the time the head escapes through it. There can seldom be any necessity for its use, I think, before the os uteri is fully dilatable, and it is more likely to interfere with the uterine action at an earlier than a later period. At the commencement of the second stage would, I should think, be soon enough, and this seems to be Sir James Simpson's practice.

There is a difference of opinion as to the extent to which the anæsthesia should be carried. Prof. Simpson prefers inducing complete insensibility at first, and then keeping up just so much of the effect as he deems advisable. Dr. Rigby prefers commencing with smaller doses in natural labour, and increasing them if necessary; and the Obstetric Committee of the American Med. Association, in their Report, agree with this view. Of course, if we are to operate, the patient should be placed thoroughly under the influence of the chloroform before we commence, and its effects kept up by occasional inhalation. But in ordinary cases, as I have said, I prefer beginning with a moderate dose and watching its effects, and, if necessary, increasing the anæsthesia.

The dose should be administered at the beginning of each pain, and increased when the head is passing over the perineum. The anæsthetic state may be kept up for hours without mischief, especially when complete insensibility is not required.

I have tried various modes of administration, instruments specially contrived for the purpose, sponge, lint, &c., and until lately I have preferred the one originally proposed by Sir James Simpson—viz., a clean white pocket-handkerchief, folded funnel-shape, into which half a drachm or a drachm of the chloroform is to be poured, and which may then be first placed near the mouth of the patient, and after a few respirations, over both mouth and nose. It is a good plan to allow the patient to hold the handkerchief herself, unless we wish to produce deep anæsthesia, as it will fall from her hand when sleep commences. I have, however, used lately an apparatus contrived by Dr. Skinner, of Liverpool, which works admirably, securing an ample supply of atmospheric air and of chloroform without waste of the latter. It consists of a wire framework, covered by flannel, kept from contact with the mouth and nose, and upon the convex surface of the flannel chloroform is *dropped* from a bottle closed by a cork and drop-tube.

CHAPTER IV.

CONVALESCENCE AFTER NATURAL LABOUR.

THE history of natural labour would be incomplete did we not say something of the state of the patient after delivery, both as to the effects produced, the gradual restoration of the parts engaged, and the requisite treatment.

If we examine the condition of a patient a few hours after delivery, we find a considerable change, both locally and generally, and which cannot be attributed to mere fatigue. The nervous system is more or less affected; the secretions are altered, and new ones established; the condition of the uterine system itself, and in its relations, is completely changed, the circulation disturbed, &c. &c.

Let us briefly examine these peculiarities separately.

1. The *nervous shock*.—The sudden alteration of the eye, the diminished or increased sensibility of the brain, the disturbance of the respiratory and circulating systems, the modified secretions, the great exhaustion, &c., are all evidences of a shock to the nervous system, the effects of which are thus extensively felt. After easy labours the shock is not very remarkable, and the patient soon recovers from it; but it is too manifest to be doubted after those of a more serious character. I cannot agree with those who attribute the state of the patient to fatigue, and I am happy to have in this opinion the support of the late Professor Hamilton, of Edinburgh, who, in his practical observations, distinctly recognises this nervous shock as an effect of labour. When it is moderate, it gradually subsides if the patient be kept free from all excitement and disturbance, and obtain a few hours' sleep. In proportion to the rapidity and completeness of its subsidence, will be the return of comfort and health to the patient.

2. The *state of the circulation and respiration*.—The changes induced in these systems appear to be the combined result of the nervous shock and muscular exertion. From extensive investigations I have obtained the following results. During the second stage of labour the pulse (as already noted) always increases in frequency, though the amount varies in different persons. Shortly after delivery it falls, nearly, but not quite, in proportion to its previous frequency—*i.e.*, it descends nearly as much below the ordinary standard as it was above it. After the lapse of a few hours a reaction takes place, the amount of which is nearly, but

not quite, in proportion to the original increase and subsequent collapse. Again, after twelve or fourteen hours, it subsides, to be again increased on the secretion of the milk; after which, if the patient go on well, it gradually returns to the ordinary standard. To illustrate my meaning, let us suppose that during the second stage the pulse mounts up to 120; then, during the collapse, it will fall perhaps to 60; and, on reaction taking place, it will rise to 100 or 110. I do not intend to give this illustration as the accurate standard of these changes, but merely as illustrative of the alternations I have generally observed; nor do I say that they occur in every case, but only that I have noticed them in a very large majority. I have never been able to discover any proportion between frequency of pulse induced by the secretion of milk and its previous state. The importance of these successive alternations will be seen more strikingly when we come to consider the variations from normal convalescence; it may suffice to say, that I have seldom seen them absent (the pulse having increased during the second stage) without serious cause.

The frequency of respiration after natural labour is in accordance with that of the pulse, when the nervous shock has been moderate. During the increase of the circulation the number of respirations per minute is increased, and again diminished during the collapse.

3. *State of the uterus, vagina, &c.*—Immediately after delivery the uterus contracts more or less firmly, so as to reduce its size to about that of an infant's head. This contraction is beneficial in several ways: it prevents hæmorrhage, it empties the uterine cavity, and diminishes the calibre of the uterine vessels and sinuses. After a short period of contraction an interval of relaxation ensues, followed in its turn by renewed contractions. The repeated contractions and concurrent absorption reduce the size of the uterus gradually, until, about the eighth or tenth day, it is small enough to descend into the pelvis. Previous to this, it can be examined through the relaxed abdominal parietes, and a tolerably accurate knowledge obtained of its condition; but subsequently we can only reach the fundus at the brim of the pelvis; and after another week it disappears altogether. Some, as Murat and Ramsbotham, attribute this rapid diminution in size to uterine contraction alone; others conceive, with Dr. Hamilton, that absorption goes on rapidly at the same time, and recent investigations show that Dr. Hamilton is right. Dr. Heschl has described the process minutely as a fatty degeneration, and his views confirm those of Dr. Retzius, of Stockholm.

It may be interesting to my readers to have a brief sketch of the changes which take place after delivery, according to the most recent researches, although there are several points which require confirmation and elucidation. According to Dr. Heschl, the fibres of the uterus undergo an entire fatty transformation, commencing between the fourth and eighth day after delivery, and at all points pretty evenly. With the advance of the fatty transformation, the uterus becomes friable, and the tissue surrounding the fibres becomes absorbed, the structure loses its reddish colour, and becomes of a dirty yellow. About the fourth week, the uterus having resumed its normal volume, the commencement of a new uterine tissue may be observed; in the body of the organ, and in its outer layer, nuclæi, cells, and finally cells drawn out into fibres, make their appearance, and ultimately become the new uterine substance. As these increase, the old tissue is absorbed, and the process is complete at the end of the second month. During this process going on in the cervix uteri, hæmorrhage often occurs, which gives to this portion the ecchymosed appearance mistakenly attributed to the effects of labour. The veins and capillaries undergo a similar transformation.*

The condition of the cavity of the uterus is of great interest. When examined a day or two after delivery, the lining membrane appears loose and corrugated, somewhat softened, and covered more or less by patches of the decidua. The part to which the placenta was attached is raised above the level of the surrounding parts; its surface is unequal, resembling in this respect a granulating ulcer; its size is wonderfully reduced. The whole internal surface is of a dark ash colour, while the discharge upon it may be greenish or brownish, giving the appearance of a morbid condition of the parts—indeed, I have known it pronounced to be gangrene. The structure of the uterus, if cut into, is found to be less dense than natural, and the fibres more distinct; the sinuses are still very evident, and at the placental insertion they are filled with clots of blood. The os and cervix uteri are covered with ecchymoses, as though they had been severely bruised; and sometimes small lacerations may be observed in the margin. The orifice remains open for some days, but gradually closes. According to Dr. Heschl, the placental spot undergoes a fatty transformation similar to the other parts, and a formation of a new uterine substance.

According to Cruveilhier, Ferguson, and others, the mucous membrane is thrown off at delivery, and the muscular fibres left bare; and Dr. Heschl describes its re-formation, but he admits that the matter is not very clear to himself. A few days after delivery the internal surface of the uterus appears covered with a red-coloured soft, pap-like, flaky substance, consisting of pavement and cylindrical epithelium, and young cellular substance, in which vessels become evident the third week, and the glands afterwards. Now, I would just observe, that if the mucous membrane is thus exfoliated after labour, it is the only example in the human body of a mucous membrane undergoing the process *physiologically*, and, from the very few observations I have been able to make, I feel inclined to agree with Dr. M. Duncan,* that no such exfoliation takes place, except, perhaps, at the insertion of the placenta, and of this I do not feel quite sure. Dr. D. examined several cases most carefully, and in none was the uterus denuded of mucous membrane. Of one where death had taken place on the fourth day after delivery, he thus speaks:—"The whole inner surface of the organ was manifestly covered by a mucous membrane; lacerated at the site of the placental insertion, a surface of between three and four inches in diameter, a number of clots were entangled in the venous openings. Elsewhere the mucous membrane was distinct. It was covered by the lochial secretion. On scraping the surface, the lochia and epithelium were easily removed, laying bare the fibrous structures of the mucous membrane beneath," thus confirming Virchow's observation that the site of the placenta was the only part denuded of mucous membrane. Dr. Chisholm has published two cases analogous to those of Dr. M. Duncan.

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* Remarks on the Conduct of the Human Uterus after Delivery, trans. by Dr. R. M'Donnell, of Dublin.

The *vagina* is speedily reduced in size after its great distension: at first there is considerable heat and soreness; but this shortly subsides, unless the head of the child have remained long in the pelvis, or the lochia be acrid. The lower outlet, too, resumes its natural capacity in a shorter time than would have been believed possible.

The abdominal integuments are longer in resuming their natural state; they remain flaccid and loose for a considerable time; but if care be taken in the bandaging, but little evidence, beyond the presence of the white streaks, is afforded, after a month or two, of their previous distension.

4. *After-pains.*—The contractions of the uterus, subsequent to delivery, of which we have spoken, are generally unaccompanied by pain in primipara; but in subsequent labours they cause more or less suffering, and are called "after-pains." They vary a

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* Dr. J. M. Duncan on the Internal Surface of the Human Uterus after Delivery.—British and Foreign Med.-Chir. Review, Oct. 1855, p. 506.

good deal in their frequency, their severity, and their duration. The first is generally felt within half an hour after delivery, and they ordinarily cease in thirty or forty hours, though they may continue longer. They are not generally accompanied by bearing-down efforts, nor by increased frequency of the pulse. During their presence the discharge from the uterus increases, and coagula are frequently expelled. From this latter circumstance they have been attributed to the presence of coagulated blood in the uterus, but, at most, this is only an occasional exciting cause. Their operation is, within certain limits, undoubtedly salutary; they prevent hæmorrhage, diminish the size of the uterus, and expel its contents. The application of the child to the breast often brings on or aggravates the after-pains.

5. *The lochia.*—The discharge of blood which accompanies delivery continues for some time afterwards, doubtless from the mouths of the vessels exposed by the separation of the placenta; but after a while the character of the discharge changes, and it can no longer be considered a mere escape of blood, but exhibits all the characters of a secretion. This state of the lining membrane of the uterus would lead us to expect such an occurrence. The discharge is called the "lochia;" or, in popular language, "the cleansings." For three, four, or five days, it continues of a red colour, but much thinner, and more watery than blood, and not coagulable; it then sometimes becomes yellowish, like puriform matter; but more frequently maintaining its serous consistence, it changes its colour successively to greenish, yellowish, and lastly to that of soiled water.

It has a very peculiar odour, which can neither be mistaken nor forgotten, but which it is impossible to describe. The duration of the lochia varies a good deal; in some patients it ceases naturally and without bad effects, a few days after delivery, and I have repeatedly observed this with those delivered of still-born or putrid infants. Generally speaking, in these countries it does not cease till about the end of three weeks, or a month; but much depends upon the constitution of the person. As to the quantity, it is impossible to fix any limits; it depends partly upon the extent of secreting surface, and partly upon the duration of the discharge. As the secretion is necessary for uterine health, the sudden interruption of it is generally attended with evil consequences.

6. *The secretions and excretions.*—From the exertions of the second stage of labour the secretion of the skin is increased, so that the surface is bathed in perspiration. After delivery, this

active state of the secretion diminishes somewhat, but still continues above the ordinary standard; and very often the perspiration has a faint sickly odour. The skin is soft and flabby, with a slightly greasy feel. As convalescence progresses, the surface returns to its natural state.

The kidneys may retain their usual activity, or, which is more frequent, have it somewhat increased after delivery, notwithstanding the unusual amount of perspiration; but this may be owing to the diet consisting principally of fluid matter.

The state of the bowels varies; sometimes it is unaltered; in others it is the reverse of what it was during gestation, patients who were constipated having now no need of medicine; and those who were annoyed by diarrhœa having solid motions. The latter change is by no means uncommon, and may probably be owing to the increased secretion from the skin and kidneys.

7. *The milk.*—The enlargement of the breasts during gestation is generally accompanied with the secretion of a serous fluid, differing from true milk, though in some cases (seldom with first children) true milk is secreted during labour, and the woman can give suck immediately afterward.

In ordinary cases, however, the breasts remain quiescent for about twenty-four hours, but soon after that begin to enlarge, with stings of pain. At the end of the second or beginning of the third day, they are perceptibly larger, heavier, and more tense; the patient may suffer from rigors, heat of skin, pain and soreness of the breasts, and the pulse is quickened. At this time the secretion commences, at first slowly and with difficulty, but afterwards more freely and in proportion to the freedom is the diminution of the pain and fever, until, after a few days, it takes place without distress or disturbance. The milk (colostrum), during the first five or six days, differs from that secreted afterwards, and often acts as a purgative to the child.

MANAGEMENT OF WOMEN IN CHILDBED.—I cannot do better than follow the order in which I have noted the phenomena of childbed.

In ordinary cases the *shock to the nervous system* does not require any active treatment. The patient should be kept in a state of perfect quiet, the room slightly darkened, and very few persons except the nurse admitted. Little talking should be allowed, and no whispering. Everything calculated to excite mental emotion should be avoided, and the patient be kept calm and cheerful. The horizontal posture should be strictly preserved, and the patient allowed to sleep, after which the nervous system will have recovered its tone, and the patient will be free from danger on this account.

As the state of the *pulse* is merely symptomatic, it will be best remedied by our successful management of the patient in other respects. It should be narrowly watched, and accurately estimated, as its deviations will often be the first evidence of mischief going on.

Immediately after the expulsion of the after-birth, a warm napkin should be applied *to the vulva*, and changed at short intervals during the day. This will afford relief from the smarting pain consequent upon the passage of the child. After some hours, when the patient is recovered, the external parts should be washed with tepid milk and water, containing a small portion of spirit. This must be repeated twice a day, not only for the sake of cleanliness, but to aid in restoring the parts to their natural state.

A horizontal posture is peculiarly favourable to the general condition of the patient, and especially to the uterine system, in the relaxed state in which it is after delivery; the patient cannot assume an upright position without a certain amount of displacement, and a risk of hæmorrhage, or possibly of sudden death. By keeping the patient on her back, we may even remedy old displacements. A lady had prolapsus uteri after her second confinement, which lasted till she became again pregnant; this was mentioned to me when I was called to her in her third labour. I kept her unusually long in bed, and subsequently on a sofa, and the parts completely recovered their natural state, so that she suffered no more from the displacement. In ordinary cases, the *after-pains* require no treatment; but if they should deprive the patient of sleep, we may give an aromatic purgative or a dose of laudanum.

The only attention which the *lochia* require is, that the napkins should be changed sufficiently often, and applied warm, as any sudden impression of cold to the external parts may be followed by suppression of that discharge.

Directions should be given for the patient to void urine within six or eight hours after delivery, or sooner; and this should be done as nearly in the horizontal posture as possible. Owing to the distensible state of the abdominal parietes, the patient will often wait much longer, if not reminded; and the consequences may be very troublesome, if not serious. The bladder may become paralysed, or inflammation may spread from it to the peritoneum. If there should be any difficulty in evacuating the bladder, as sometimes happens, a cloth wrung out in warm water, and applied to the vulva, will probably remove it; or, if not, we must have recourse to catheterism.

The *state of the bowels* after delivery is of great importance; it is, perhaps, better that they should continue quiet for forty-eight hours after delivery; but after that time has elapsed, we should procure a discharge by medicine, if there should be none spontaneously. A dose of castor oil, senna, or rhubarb, may be given, and, if necessary, repeated. The frequency of repetition must be regulated by the state of the bowels previous to labour. If we suspect any accumulation, we should not be satisfied until the intestines are well cleared out; and if the patient do not suckle her child, purgatives will be the more necessary, for the relief of the breasts. In the latter case, the saline purgatives will be found the more useful.

The state of the surface will point out the propriety of not exposing the patient to a draught of cold air. She should be allowed to cool gradually, and then the bed and bed-clothes so arranged as to afford a comfortable degree of warmth. The chamber should be kept cool and fresh. The smaller the fire (if there be one) the better.

When the breasts begin to enlarge and become painful, relief may be obtained by friction with warm oil or fomentations, at the same time giving a dose of aperient medicine. But the best remedy is the application of the child; and the sooner this is done the better, as the secretion and escape of the milk will be facilitated, the feverishness diminished, if not avoided, and a good nipple more easily formed than when the breasts are distended. It is better to do this, even if it should not be the intention of the patient to suckle her infant, as it will afford relief; and by not suffering the child to do more, we insure the ultimate subsidence of the secretion, which is always in proportion to the demand upon it; if this be very slight, it will soon cease altogether.

The importance of preserving the horizontal posture has already been stated; I shall therefore merely add, that the patient should never leave her bed, even to have it made, before the eighth or ninth day; far more mischief results from premature exertion than from all the errors in diet added together.

The regulation of the diet is, nevertheless, of considerable importance, as excess, by inducing feverishness, may retard the convalescence. The patient should be confined to slops—gruel, panada, arrow-root, milk, whey, weak tea, &c.—with bread or toast and butter, or biscuit, for five or six days. When the excitement produced by the secretion of milk has subsided, if there be no counter-indication, she may take some broth, and on the seventh or eighth day some chicken, or a mutton chop, with some wine and water. In all that concerns the diet, or the assumption of the upright position, or making exertion, it cannot be too strongly impressed upon all, that an excess of caution is an error on the safe side.

ON CERTAIN VARIATIONS FROM ORDINARY CONVALESCENCE.—Although the following observations are a deviation from the plan I proposed, yet I should not feel justified in their omission, and I do not know that a better opportunity will offer for them than the present, as they may be usefully compared with the preceding description of ordinary convalescence. These deviations may depend upon the constitution, or the character of the labour, or upon pressure exercised locally. Even without reference to the influence of the labour, there are certain irregularities which occasion anxiety both to the patient and to her physician. Some of these issue in serious disease; others, more numerous, are mere temporary deviations from the normal course, but requiring familiarity and tact to distinguish them from the more important attacks. Of the more serious affections—such as fatal syncope, puerperal fever, &c.—I shall enter fully in the latter part of this volume.

1. *The nervous shock* may be very severe. In these cases the patient complains of great exhaustion; the senses are either unnaturally dull, or morbidly acute, the breathing is hurried and panting, and the accordance between the respiration and circulation is broken. The aspect of the patient is that of a person in a state of collapse. The countenance is expressive of suffering, anxiety and oppression. The pulse may be either very slow and laboured, or unusually rapid, very small, and fluttering. There are many cases, however, where the shock, though far from being so severe as in the case I have supposed, is quite sufficiently so to excite the fears of the medical attendant. Reaction is long before it occurs, or it may take place imperfectly or excessively, and the patient remain for some time in a very weak condition.

Under proper treatment, the patient will gradually recover from this state of exhaustion or collapse, unless the shock be extreme, and then death may supervene in a few hours. I have seen several cases of this kind: in one case the labour was tedious, but terminated naturally; two others were instrumental deliveries; but in none, where a *post-mortem* examination was obtained, was there either injury or disease discovered. A due estimate of the nervous shock is of great importance in severe cases; for in almost every instance the progress of the convalescence is in inverse proportion to the amount of this disturbance.

The best remedy in these cases is opium, either in a large dose, or in small and repeated ones; it not only gives the patient a chance of sleep, the best restorative of all, but even if it fail in this, the system will be quieted, the respiration rendered more equable, the pulse slower and more natural, and the relation between these two systems restored.

The exhibition of stimulants (wine or brandy and water) in moderate quantities is necessary; but we must be careful not to exceed, or they will do mischief instead of good. The amount of stimulants given in cases of collapse should have some reference to the probable reaction, as well as to the present state of the patient. Ammonia or musk are the best medicinal stimulants, and they may be combined with the opium. The diet of the patient, when the effects of the shock have subsided, must be nutritious. It may be necessary to postpone the application of the child to the breast for some days, or even to give up suckling altogether in some cases.

All that has been said already upon the necessity of perfect quiet, applies with tenfold force to these cases of extreme nervous shock.

2. *The state of the pulse.*—One variation from the usual alternations of the pulse has just been noted, in cases of great nervous shock, when it either sinks below its due proportion, or more frequently remains very quick, weak, and fluttering, during the period of collapse.

In almost all the cases of flooding after labour, when I have had an opportunity of examining the pulse up to the time of the occurrence, I have found it remain quick, and perhaps full, instead of sinking after delivery. This has been so marked in several cases, that I now never leave a patient, so long as this peculiarity remains; and in more than one instance I believe the patient has owed her safety to this precaution. Three cases occurred within a very short time of each other, in which I noted this undue quickness of the pulse without any other untoward symptom; at that time there was no excessive discharge, and the uterus was well contracted. In all these, alarming hæmorrhage occurred within an hour, and was with difficulty arrested. I have also remarked an undue frequency of pulse when the after-pains are extremely violent; and as the uterus is in such cases rather tender on pressure, it requires care to distinguish between this state and the commencement of inflammation. This observation will also apply to the quickening of the circulation, which takes place when lactation commences, and which, in addition, is accompanied by rigors. A careful examination, however, will generally lead us to a correct conclusion, and the subsequent diminution of the frequency of the pulse will remove all doubt. Again, the pulse is quickened when a large coagulum is contained in the uterus, or if the patient suffer from diarrhœa, or gastric disturbance. In some of these cases the diagnosis may be obscure, and it may be necessary to suit our treatment rather to the anticipated attack than to the present symptoms: thus, we may give small doses of blue pill or calomel in combination with opium, along with medicines suited to the peculiar symptoms present. All the observations I have been able to make confirm Dr. John Clarke's remark, that no patient can be considered safe whose pulse exceeds one hundred. I beg to refer to a most valuable paper on the semeiological value of the pulse in childbed by Dr. M'Clintock.* The subject is interesting and important, and has received due consideration at his hands.

3. *The state of the uterine system.*—Instead of a gradual decrease in the size of the womb, I have occasionally found on the fifth or sixth day that its bulk has increased, and that it has felt less firm than previously: this, combined with increased frequency of the pulse, has apparently threatened an attack of hysteritis; nor was this anticipation lessened by the uncomfortable sensations of the patient, nor by the sudden increase of the lochia. However, in most of these cases, I found upon applying hot fomentations to the abdomen, that more or less coagula were discharged, affording instant relief to the patient, and indicating the source of the symptoms. Purgative enemata also favour the expulsion of the clots; and in such cases may be given with great benefit.

Sir James Simpson has published some interesting observations on the morbid deficiency and morbid excess in the involution of the uterus after delivery, and has given several cases in which the uterus continued for a considerable time as large as after delivery. It is not the result of any deposit, and the histological characters are those of the pregnant uterus. These cases are not common, but the opposite extreme is still more rare. In one case related by Sir James Simpson, the patient after her confinement suffered from amenorrhœa, anæmia, and diarrhœa, under which she finally sank; and on examination the uterus was diminished one-third below the natural standard.[*] Similar conditions of the uterus had been pointed out by Dr. Montgomery.[†]

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* Dublin Journal. 1861.

It has been already mentioned that the uterus is not free from tenderness in cases where the after-pains are severe; and if it be rudely pressed, the outcry of the patient may lead us to suspect the presence of serious disease. It will be observed, however, that this tenderness *is greatest during each uterine contraction, and that as these contractions subside the soreness diminishes.*

Fomentations to the abdomen will generally mitigate this sensibility; but if the after-pains be severe, and the tenderness considerable, a full dose of laudanum, followed by an aromatic purgative, will probably relieve both.

The *vagina* may be attacked with inflammation, which sometimes proves extremely distressing: this will form the subject of a separate notice.

In cases where the lochia are acrid, the orifice of the vagina, with the labia and external parts, are apt to be excoriated. The patient may suffer extremely either from a smarting pain, or from itching; and it is difficult to say which is the more distressing. Extreme cleanliness, frequent bathing, lead lotions, black wash, or vaginal injections of warm water may be tried, and will ordinarily afford relief: if not, the disease will generally subside with the cessation of the lochia.

4. *The after-pains.*—Instead of the after-pains coming on about half an hour or an hour after the labour, in moderate degree, and ceasing after a short time, they occasionally commence immediately after the extrusion of the placenta, with great severity, and long continuance. In these cases the tenderness of the uterus is marked, but when the pain is relieved by remedies, the tenderness disappears also. The pulse, also, is quickened for the time. This deviation does not depend upon the presence of coagula, as in the worst cases I have seen none were expelled, but it seems rather a spasmodic contraction of the uterine fibres. The best remedy is a full dose of opium, which should be repeated if necessary. At the same time, hot flannels may be applied to the abdomen and vulva.

The after-pains sometimes continue at intervals unusually long, and are very severe whenever the child is applied to the breast. They occasion distress and exhaustion by preventing sleep, and should therefore be relieved, if possible, by cordials, aromatic purgatives, or a dose of opium.

5. *The lochia.*—Variations in the quantity, quality, or odour

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[*] Edin. Monthly Journal, Aug. 1852, p. 127.

[†] Dublin Journal, Nov. 1835. Ibid., vol. xxiii. p. 161.

of the lochia not unnaturally excite great alarm in the mind of the patient, who regards any deviation in this secretion as a proof of serious disease. Yet very remarkable differences do occur, without any morbid affection of the uterus or vagina.

The discharge may cease a few hours after delivery, especially after the birth of still-born or putrid children, without any unpleasant symptoms.

The discharge may continue the usual time, but in very small quantity; and this is commonly the case when flooding occurs during or after delivery.

On the other hand, it may be excessive, though not prolonged beyond the usual time; or without being excessive, it may continue unusually long. In these cases it may be necessary to allow the patient a better diet, and to give tonics, such as bark, preparations of iron, &c.

In some cases, the lochia, after decreasing in quantity for some time, are suddenly discharged in double quantity, and of a red colour, but without coagula. This generally happens when the patient is permitted to sit up too soon. Or it may happen at a later period, in consequence of walking about too much. A little extra rest will, however, suffice to restore the patient to her former state.

Again, the os uteri is sometimes obstructed by a clot, and the lochia are greatly diminished, or perhaps altogether restrained, until the expulsion of the clot affords an exit to the accumulation.

Instead of the usual changes, from red to yellow, or greenish, the red discharge may persist; or after these changes have taken place, the red discharge may return. In these cases it is necessary to be on our guard, as the change may be the precursor of secondary hæmorrhage. The patient should be confined to the horizontal position, and clothed very lightly.

The lochia, after going through their ordinary changes, may terminate in uterine leucorrhœa, which may become permanent. This will be best remedied by counter-irritation to the sacrum, and the internal exhibition of copaiba, iron, or ergot of rye.

Again, the unusual colour of the lochia may excite alarm. Instead of the transition from red to a pale red, yellowish, or greenish colour, they are sometimes a dark brown, and perhaps more tenacious than usual, or acrid, so as to excoriate the vulva.

Lastly, examples occasionally occur where the lochia have a very offensive fœtid odour, occasioning great annoyance both to the patient and her friends. The discharge is generally of a dark colour, and often acrid. It may arise from the decomposition of a small portion of the placenta or membranes which were left in the uterus or vagina, or from the putrefaction of coagula. In such cases the vagina should be syringed two or three times a day with warm milk and water, or a very weak solution of chloride of lime.

6. *The bladder.*—"After severe labour," says Dr. Burns, "the neck of the bladder and urethra are sometimes extremely sensible, and the whole of the vulva is tender, and of a deep red colour. This is productive of very distressing strangury, which is occasionally accompanied with a considerable degree of fever. It is long in being removed, but yields at last to a course of gentle laxatives, opiates, and fomentations. Anodyne clysters are of service. An inability to void the urine requires the regular and speedy use of the catheter."

Retention of urine is not very unfrequent after a prolonged first labour. It is distressing, but not dangerous, and I have generally found the bladder resume its functions after seven or eight days; during which catheterism will be necessary once or twice a day. I have no doubt that it results from a slight degree of inflammation, caused by pressure, or from a spasmodic action of the sphincter.

7. *The breasts.*—Variations in the period at which the milk is secreted are common, but of no moment. If the vascular action be excessive, it must be moderated by antiphlogistic remedies, such as tartar emetic, purgatives, fomentations, &c., and by the frequent application of the infant. If, as in some rare cases, no secretion should take place, the child will require a wet nurse, but the mother will not suffer. When the nipples are deficient or mal-formed, we must endeavour to draw them out by the breast pump; but if this do not succeed, we must obviate the ill effects of the secretion of milk, by tartar emetic, saline purgatives, fomentations, &c.

8. I am tempted to say a word here about a discomfort which often follows labour, and may last for some time: I allude to a feeling of weight and bearing down. At first, it results partly from the increased weight of the womb, and partly from the relaxed condition of the passages. Probably these do not return to their natural condition before the end of a month, and rest during that time is the best and generally effective remedy. But in some cases, this distressing feeling is prolonged for two or three months, and in such cases, I have always found on examination, that a more or less intense vaginitis existed. A solution of nitrate of silver (gr. xxx. ad ℥j) applied twice a week, with daily syringing with cold water, never fails to relieve the disease.

CHAPTER V.

PARTURITION.—CLASS II. UNNATURAL OR ABNORMAL LABOUR. ORDER 1. TEDIOUS LABOUR.

DEFINITION.—The head of the child presents, and the labour is terminated without manual or instrumental assistance, but it is prolonged beyond twenty-four hours, from causes which occasion delay *in the first stage.* The placenta is expelled naturally.

Very slight experience is sufficient to show that delay in labour may occur in either the first or second stage, and a more extended observation will prove, 1, that when the delay is excessive, the *relative* duration of the two stages is destroyed, so that they bear no steady proportion to each other: thus, for instance, in a labour of sixty hours, the first stage may occupy fifty-nine, and the second only one, or *vice versâ;* 2, that the effect of a prolonged labour upon the constitution of the patient, depends upon the stage in which the delay occurs; and 3, that delay in the first stage involves *per se* very little if any danger, no matter how tedious it may be, but that delay in the second stage, beyond a comparatively short time, is always of serious import; therefore, the only injury done by a prolonged first stage, is the influence it may have upon the patient during the second stage, by rendering her less tolerant of the constitutional suffering. Although these deductions are not distinctly enunciated by writers on midwifery, yet they appear to be involved in their practical remarks, inasmuch as they distinguish the causes of delay in the first stage from those in the second, as being much less dangerous. The above conclusions, drawn from numerical estimates, and supported practically by high authority, are sufficient, I think, to justify our making the distinction between "tedious" and "powerless" labours to depend upon the stage at which the delay occurs. And I confess I look upon this distinction as one of the most important and practically valuable guides we possess.

STATISTICS.—Unfortunately, our best statistical reports only give the entire length of the labour, without distinguishing the stages, so that the first Table I shall give will merely show the frequency of those labours whose duration exceeds twenty-four hours.

Authors.	Total Number of Labours.	Above Twenty-four hours.
Dr. Jos. Clarke	10,387	134
Dr. Merriman	2,917	128
Edinburgh Lying-in Hosp.	2,452	48
Dr. Maunsell	839	46
Dr. Thos. Beatty	1,182	69
Mr. Lever	4,666	62
Dr. Churchill	1,285	166

Thus in 23,758 cases of labour, we have 653 prolonged beyond twenty-four hours, or nearly 1 in 36.

I may add, that delay is most common among first cases.

The following Table is intended to exhibit the relative duration of each stage in labours of twenty-four hours and upwards, in which the delay occurred in the first stage, and the results to the mother and child. The registers of the Western Lying-in Hospital have furnished the data, and as the cases were therein entered under the inspection of the late Mr. Speedy and myself, I believe they may be depended upon.

Number of Cases.	Duration of Labour.	Length of First Stage.	Length of Second Stage.	Results to Mother.	Results to Child.
	hours.	hours.	hours.		
5	24	$23\frac{1}{2}$	$\frac{1}{2}$	favourable	favourable.
13	24	23	1	do.	12 do. 1 putrid.
2	24	22	2	do.	1 do. 1 still-born.
3	25	22 to 24	1 to 3	do.	do.
1	25	19	6	do.	do.
2	25	17	8	do.	do.
2	25	16	9	do.	1 do. 1 still-born.
1	26	$25\frac{1}{2}$	$\frac{1}{2}$	do.	do.
7	26	25	1	do.	6 do. 1 still-born.
2	26	23	3	do.	do.
3	27	$26\frac{1}{2}$	$\frac{1}{2}$	do.	do.

Number of Cases.	Duration of Labour.	Length of First Stage.	Length of Second Stage.	Results to Mother.	Results to Child.
	hours.	hours.	hours.		
2	27	26	1	favourable	favourable.
1	28	27½	½	do.	do.
3	28	27	1	do.	do.
2	28	26	2	do.	do.
1	28	25	3	do.	do.
1	28	22	6	do.	do.
1	29	28½	½	do.	do.
2	29	28	1	do.	do.
2	29	27	2	do.	do.
1	30	29½	½	do.	do.
2	30	29	1	do.	do.
1	30	28	2	do.	do.
1	30	26	4	do.	do.
1	30	23	7	do.	do.
1	30	19	11	do.	do.
2	31	30	1	do.	do.
2	31	29	2	do.	do.
1	31	27½	3½	do.	do.
1	31	27	4	do.	do.
1	32	31½	½	do.	do.
4	32	31	1	do.	do.
1	32	24	8	do.	unfavourable.
1	33	32½	½	do.	favourable.
1	33	32	1	do.	do.
1	33	31	2	do.	do.
1	34	33	1	do.	do.
1	34	30	4	do.	do.
1	34	29	5	do.	do.
1	35	34½	½	do.	do.
2	35	33	2	do.	do.
2	36	35½	½	do.	do.
1	36	35	1	do.	do.
1	36	33	3	do.	do.
1	36	31	5	do.	do.

Number of Cases.	Duration of Labour.	Length of First Stage.	Length of Second Stage.	Results to Mother.	Results to Child.
	hours.	hours.	hours.		
1	37	36½	½	favourable	favourable.
1	37	32	5	do.	do.
2	38	37	1	do.	do.
2	38	34	4	do.	do.
1	39	38½	½	do.	do.
1	39	35	4	do.	do.
2	40	39¾	¼	do.	1 do. 1 dead.
1	41	39	2	do.	dead.
1	41	33	8	do.	favourable.
1	42	41¾	¼	do.	do.
1	43	41	2	do.	do.
1	44	26	18	do.	do.
2	45	44	1	do.	do.
1	45	44½	½	do.	do.
1	46	36	10	do.	do.
1	47	43	4	do.	do.
1	48	47	1	do.	do.
1	48	44	4	do.	do.
1	48	34	14	do.	do.
1	49	38½	½	do.	do.
1	49	46	3	do.	do.
1	49	41	8	do.	dead.
1	50	49½	½	do.	favourable.
1	50	49	1	do.	do.
1	51	50	1	do.	do.
1	51	48	3	do.	do.
1	52	48	4	do.	do.
1	53	52¼	¾	do.	do.
1	53	52	1	do.	do.
1	53	46	7	do.	do.
1	54	53½	½	do.	do.
1	54	53	1	do.	do.
1	54	33	21	do.	do.
1	55	54½	½	do.	do.

Number of Cases.	Duration of Labour.	Length of First Stage.	Length of Second Stage.	Results to Mother.	Results to Child.
	hours.	hours.	hours.		
1	57	56½	½	favourable	favourable.
1	57	56	1	do.	do.
2	57	53	4	do.	do.
1	58	57	1	do.	do.
1	59	57	2	do.	dead.
1	59	55	1	do.	favourable.
1	60	59½	½	do.	do.
1	66	62	4	do.	do.
1	69	63	6	do.	do.
1	74	72	2	do.	do.
1	74	73¾	¼	do.	do.
1	76	71	5	do.	do.
1	78	72	6	do.	do.
1	96	66	30	do.	dead.
1	100	84	16	do.	favourable.
1	103	74	29	do.	do.
1	177	176	1	do.	do.

Some apology may be due for the length of this Table, and I trust it will be found in the fact that, at least as far as I know, it is the only one of the kind on record. The reader will understand that from this list I have excluded all presentations but the head, all operative cases, all cases which were prolonged in the second stage, and all such as were of doubtful accuracy, but that beyond this I have in no degree selected the cases. The entire number amounts to one hundred and forty-three. Of these not one of the mothers died, although in some cases the first stage was enormously prolonged, and but ten of the children, one of which was putrid. If the relative length of the stages be examined, it will be found that it did not follow, because the first was very long, that the second should be long also; and in many cases (not included in the Table) when the second stage was delayed, the first was extremely short. Thus I think that, so far as it goes, this Table proves the propositions with which I started; viz., that "when the delay is excessive, the relative duration of the two stages is destroyed, so that they bear no steady proportion to each other," and that "delay in the first stage involves very little if any danger, no matter how tedious it may be."

The only apparent exceptions to this rule of which I am aware, are those cases in which some mechanical impediment exists, and which belong to an order to be hereafter considered. In these cases mischief arises, not from the prolonged first stage so much as from the impediment to the progress of the second; and after a time, the characteristic symptoms of the second stage present themselves and run their course, and only then after some time are there any bad symptoms, so that the case becomes virtually one of prolonged second stage; and 2, certain cases in which, from some peculiar irritability of constitution, prolonged suffering in the first stage disposes the patient to "powerless labour" in the second. In such, the uterine power becomes exhausted, and the pains instead of increasing when the obstacle is removed, gradually diminish in force, and without any mechanical cause, the labour may be indefinitely prolonged, and constitutional symptoms set in. Such cases are, however, comparatively rare. Of course, a prolonged first stage is a bad preparation for undue prolongation, or for any accidental complication of the second.

These conclusions I think are fairly deducible from the premises, but there are others which I would guard against, and these are, first, that because no evil happens in these cases, therefore nothing is to be done in any case where the delay is in the first stage; and secondly, that the delay was the result of bad management, whereas in most cases the patients were not brought under our care until the greater part of the time had elapsed. I do think that when we find no evil resulting from the delay, we are not warranted in too active interference; but I am equally convinced that when we can remove the cause of it, we are bound to do so. I may add, in confirmation of my own conclusions, the statement of Denman, "that neither mother nor child is ever in any danger (except in hæmorrhage or convulsions) on account of the labour, before the membranes are broken," *i.e.*, in the first stage.

SYMPTOMS.—I conclude, then, that these cases of labours prolonged in the first stage, present nothing formidable as regards the mother, and very little as regards the child; but yet we find that the continued suffering produces a great degree of fatigue, and in nervous women especially, the loss of sleep is very much felt; the spirits are depressed, and the patient expresses a great dread of the result. Notwithstanding this, however, the condition of the patient is favourable. The skin is cool, the pulse quiet, the tongue clean and moist; there is rarely any headache; the stomach may be more or less disturbed, but the other bodily functions are performed in a healthy manner. The pains recur regularly, though their extent is often limited, and their power inefficient, their duration and frequency varying occasionally. Still, a perceptible though slow progress is made. The strength is seldom impaired, and the patient often gets some quiet sleep, which tranquillizes the mind, and restores the bodily powers; there is neither fever nor inflammation, the vagina is cool and moist, and both urine and fæces are evacuated easily and spontaneously.

The tranquil pulse, cool skin, and loud outcry, are all indicative of the first stage of labour, and on examination, the head is found not to have passed through the os uteri, whether or not the membranes be broken. The nervous shock is never in proportion to the length of the first stage of labour, but of the second.

Causes and Treatment.—The causes which occasion delay in the first stage of labour are various, and not always peculiar or confined to it, and the treatment must be adapted to each. No doubt can be entertained of the propriety of removing them, when this can be done, even though the delay they occasion may be innoxious. Let us examine the principal causes and their treatment separately.

1. *Inefficient action of the uterus* is a very common cause of delay, and occurs most commonly in delicate women confined for the first time. It may arise from constitutional weakness, a deranged state of the digestive organs, mental depression, uterine plethora, or irritation of the os and cervix uteri, &c. I have also found that when from any cause (diarrhœa, for example) the labour is precipitated a few days before the time, the first stage is a tedious one, and also with the first child in cases of twins. It may also happen that when the patient is attacked by false pains (producing no effect upon the os uteri) these may run on into real pains with a prolonged first stage in consequence.

We find the pains feeble, of short duration, limited in extent, often seated in front, and producing little effect upon the bag of waters, or cervix uteri. When the intestinal canal is deranged, they are mixed up with griping pains in the abdomen, which in many cases modify or supersede the real pains. It should also be stated that bodily weakness or even the presence of fatal disease does not always involve feeble uterine effort; patients in the last stage of consumption are often delivered with great facility.

Treatment.—The first element in the management of these cases is time. We must exercise patience ourselves, and encourage our patient to do so. All that is calculated to cheer her should be communicated, and she should be occupied, if possible, and amused. If it be day-time, she should not lie down, but may rest on a sofa, and walk about occasionally, taking the pains sitting or standing. The bowels must be freed by medicine, if necessary, and for this purpose enemata of a stimulating character may be used, as they very often also quicken the uterine action. The diet should be bland and nourishing, but not stimulating.

These palliative measures will be sufficient in many cases, in others they are of no use, and the patient may be exhausted from the prolonged suffering and want of sleep; and the best thing we can then do (if there be no counter-indication) is to give a full dose of opium, so as to suspend the pains for a time and procure sleep. If it succeed, the patient will wake up refreshed and strengthened, and the pains most probably return with increased strength. In some cases, the inefficient uterine action seems due to some excess of uterine irritability, and in such cases I have found the opium of great use; and the pains, instead of being suspended, increased in force and efficiency. Perhaps this may explain the success which Dr. Soma states that he obtained from the exhibition of belladonna, without attributing to that drug any special power of increasing the uterine action. A purgative enema, administered when the patient awakes, is often of great service.

When the inefficiency of the pains depends on intestinal disturbance, it will be right to evacuate the bowels freely before the opiate be given, if one be necessary. Should there be indigestible matter in the stomach, it is probable that it will be evacuated spontaneously.

So far the remedies mentioned tend merely to the removal of obstructions to uterine action; but as it does not follow that in all cases this relief is followed by vigorous action, we have next to seek for some agents which shall act directly upon the uterus. The one upon which most reliance is placed is the *ergot of rye.* This vegetable substance appears to have been known for a long period in Germany, under the name of Rockenmutter, Mutterkorn, &c., and to have entered into the composition of various nostrums for hastening labour. It is mentioned by Camerarius in the Actes des Curieux de la Nature for 1668; and in 1777 Desgranges published his first researches upon it, in the Gazette de Santé. Its introduction into British practice was, I believe, owing to Drs. Stearn and Chapman, of New York, whose favourable experience of its effects has been tested by many practitioners, and apparently with different results. Desormeaux, Lachapelle, Beclard, Capuron, Jackson, Hall, &c., deny that it has any effect at all; on the other hand, we have the authority of Bordot, Chevreuil, Gendrin, Bigeschi, Luroth, Davies, Blundell, Jewel, Smith, and many others, in stating that it is effective and beneficial. From repeated trials, I can bear witness to its efficacy, though it is somewhat irregularly exerted; but I must add that I have seen it do mischief.

The substance itself, according to Decandolle, "is a peculiar species of fungus which attacks the ovary of grasses, and protrudes from them in a lengthened form, especially from rye;" hence the popular term "spurred rye."

It is an oblong, slightly curved grain, about as thick, and twice as long as a grain of wheat, of a dark-brown colour externally, but lighter, and with a shade of pink, internally. It has been analysed by Vauquelin and Wright. The latter chemist states its component parts as follows:

A thick white oil	31·00	grains.
Osmazome	5·50	,,
Mucilage	9·00	,,
Gluten	7·00	,,
Fungin	11·40	,,
Colouring matter	3·50	,,
Fecula	26·00	,,
Salts	3·10	,,
Loss	3·50	,,
	100·	,,

The chemical analysis of ergot has thrown but little light upon its active principle as yet, for none of its component principles produce the same effect as the substance administered entire.

It may be exhibited in various ways; that which I have found most certain, is to mix the bruised or powdered grain with a little water or milk, and simmer it for a few minutes over the fire, then give the grounds along with the fluid. Both vinous and acetous tinctures have been prepared, but I have not found them as effectual as the powder. Mr. Battley has also a "liquor secalis cornuti," which seems more certain than the tinctures; and I have also tried an extract which succeeded pretty well, and so far I have found the extr. ergot. liquid. of the British Pharmacopœia a useful preparation. From fifteen grains to a scruple of the powder, half a drachm to a drachm of the tincture, from five to ten grains of the extract, and twenty or thirty drops of the liquid extract, may be given every twenty minutes, until the effect be produced, or until we are satisfied that it will not act. I would not give more than a drachm, or at the utmost a drachm and a half of the powder (or its equivalent in tincture or extract); for if that do no good, more will be useless, and may be injurious. If it succeed, we find in five or ten minutes after its exhibition that the pains are stronger, longer, and more frequent; their increased frequency, indeed, is often remarkable, even when their force is but little augmented. I have noticed, that shortly after an effective dose has been taken, the pulse becomes slower until after the pain is over, but that ultimately it remains quicker. Besides this power of strengthening feeble pains, the researches of Dr. F. Ramsbotham and others have proved it capable of *originating* uterine action.

So far we have spoken of its beneficial effects; and although in by far the majority of cases no injury is produced by it, yet in five or six cases I have witnessed cerebral disturbance in different degrees, from a severe headache up to delirium, coma, and insensibility, follow its use. By others, it is said to disorder the stomach, and if given in large doses, to cause gangrene; but such cases must be very rare. I think I have seen retention of the placenta, from irregular uterine contraction after the birth of the child, fairly attributable to it.

By Girardin, Burns, Moreau, and others, the child is stated to be more frequently still-born after the use of ergot, either from some poisonous influence indirectly exerted upon it, or by the greater pressure of the uterus upon the cord. I have seen some cases confirmatory of this statement, and of the latter mode of explanation, as the uterine action was almost incessant. Dr. F. H. Ramsbotham's cases rather support this view, for he states that when the ergot did not bring on uterine contractions, no bad effects were produced upon the fœtus. Dr. Beatty has published a very interesting paper, to show that in certain cases the ergot does exert a poisonous effect upon the fœtus, and he concludes that the child is not safe unless the labour be concluded within two hours from the administration of the ergot. Dr. R. U. West has, however, published* some very elaborate investigations, carried on with his usual sagacity, which would show that ergot does not exert such injurious influence upon the child nor upon the mother. More recently, Dr. M'Clintock read a paper to the Dublin Obstetrical Society, in which he advocated the view that the danger to the child arises from the incessant uterine action and the consequent pressure, and I confess I am of the same opinion.

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* Trans. of London Obst. Society, vol. iii. p. 222.

From what has been said, we may conclude that ergot of rye may be tried—1, when the pains are feeble and inefficient, without special cause; 2, if the os uteri be soft and dilatable; 3, if there be no obstacle to a natural delivery; 4, if the head or breech present, and be sufficiently advanced; and 5, if there be no threatening head symptoms, nor excessive general irritability.

But, on the other hand, it should not be given—1, if the os uteri be hard and rigid; 2, if the presentation be beyond reach; 3, if there be a mal-presentation; 4, if the pelvis be deformed; 5, if there be any serious obstacle to delivery in the soft parts; and, 6, if there be head symptoms, or much general irritation.

Though in some cases, when timely administered, it may anticipate the use of the forceps at a later period, it is not likely, as some have supposed, ever to supersede the use of that instrument, and it is not suited to those cases in which the crotchet is required.

Borax is said by German writers to have the power of quickening uterine action, though it is seldom used in this country. Dr. Rigby says, "We have combined these two medicines (ergot and borax) with the best effects, and generally give them in the following manner: ℞ Secalis Cornuti ℈i—ij; Sodæ subborat. gr. x.; Aq. Cinnamomi ℥iss. M. fiat haustus. Cinnamon, which is a remedy of considerable antiquity, has also a similar action upon the uterus, although to a less degree."

At a meeting of the Edinburgh Obstetrical Society, Dr. Simpson mentioned that he had tried the Indian hemp, and found that uterine action seemed to be markedly and directly increased by it, but that his experiments were too few to be decisive.* I have never given it for this purpose, but it seems worthy of a further trial. Dr. Grigor, of Nairn, has since tried it in sixteen cases; in nine there was no perceptible increase of uterine action, but in seven it succeeded very well, without any anæsthetic or unpleasant effects.† Dr. A. Christison tried it in seven cases‡ successfully.

Dr. Maguire mentioned to me that he had tried a drop of croton oil as an oxytocic, and that it succeeded admirably, whether it acted upon the bowels or not; it did so in the only case in which I have had an opportunity of trying it, but it left a very unpleasant sensation of heat in the throat.

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* Ed. Monthly Journal, July, 1850, p. 91.

† Ibid., Aug. 1852, p. 124.

‡ Ibid., Aug. 1851.

Dr. Harris, of Alabama, has stated that a strong decoction of the uva ursi has produced the same effect in five cases, without any unpleasant symptoms.*

Dr. Radford, of Manchester, has proposed the application of galvanism in tedious labour from want of power in the uterus, in accidental hæmorrhage, irregular contraction, and to bring on premature labour, and he relates a case of hæmorrhage in which he employed it successfully, and another in which the pains had ceased. Professor Simpson tried it in eight cases of protracted labour, and thus sums up the results:—"In one instance, the pains were more frequent in their recurrence, but shorter in their duration, during the application of the galvanism. In five other cases, the employment of the galvanism neither increased the average frequency of the pains nor their average duration. In one, the pains ceased while the galvanism was applied, and returned upon its removal. In another the uterine action ceased while the galvanism was applied, and did not return for twenty-four hours afterwards." In Mr. Houghton's excellent paper, I find it stated that Mr. Dorrington used it successfully in five cases; Mr. Clarke in two;† Mr. Cleveland in one; and Mr. Dempsey in ten cases. Mr. Houghton himself succeeded admirably in five cases.‡ Thus the effects have been decided in twenty-five cases, equivocal in one, negative in seven, out of thirty-three cases, which is, I think, amply sufficient to justify a further trial.

M. Kiwisch states that he found the water douche of great use in stimulating the uterus to action. M. Paul Dubois relates one case in which he tried it; and with sufficient benefit, I think, to justify our repeating the trial.§

Dr. Washington relates that he has found dry cupping to the sacrum effective in augmenting uterine action. The first glass should be applied to the lowest point of the sacrum, and after about ten minutes, another higher up.|| I have had no opportunity of testing this, but it does not appear to me unlikely that such an effect might be produced.

I have already alluded to the beneficial effects of stimulating

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* Philadelphia Med. Examiner, Nov. 1853, p. 727.

† Dublin Hosp. Gazette, March 1, 1845.

‡ Dublin Quarterly Journal, Feb. 1852.

§ Moniteur des Hôpitaux, Feb. 12, 1853.

|| Association Journal, May 27, 1853, p. 469.

purgative enemata; and I may add that some writers have recommended stimulants externally, such as mustard poultices, or friction with stimulating liniments. I have never found them of any use.

2. *Undilatable os uteri.*—In order to put the reader in full possession of all that concerns rigidity of the cervix uteri, I shall have to trangress the strict limits of this chapter, and include a class of cases which in their effects more properly belong to the chapter on Obstructed Labour. The large majority of cases of rigid cervix offer resistance in the first stage only; *i.e.*, they yield before any symptoms of "powerless labour" set in, but a small number resist permanently. Anatomically speaking, the labour is still in the first stage, for the head is within the os uteri; but virtually, taking the symptoms as a standard, they run on into the second stage, of which they exhibit all the characteristics.

Trusting that the advantage of having the whole subject under view at once may compensate for the irregularity, I shall first speak of the ordinary class of cases. With the first child the cervix uteri is more unyielding than subsequently, and also in women of advanced age. It may give way, however, within a reasonable time; but in some cases it does not, and on examination we find the lips thin, hard, and rigid, or soft, semi-pulpy, or œdematous, and that little progress in dilatation is made during each pain. The pains themselves may be frequent, and very severe, notwithstanding the slight effects they appear to produce. The thick pulpy or œdematous cervix uteri is carefully to be distinguished from the soft and flabby condition, which is a kind of transition state in the ordinary process of dilatation, and into which the thin and rigid cervix must pass before it will dilate. The pulpy œdematous cervix is as undilatable as the thin and hard. The latter is more frequent in primipara; the former occurs indifferently, and appears to be the result of irritation, caused in some cases, possibly, by too frequent examination.

Treatment.—Several remedies have undoubted power in most cases of this kind, and a suitable selection of them should be tried before we conclude that further interference will be necessary. In fact, the failure of these is in many cases the only test we have whether the rigidity be such as will yield or will resist.

The first, and perhaps the most effectual, when the patient can bear it, is loss of blood. Some caution is necessary, especially at the present time, not to carry it to too great an extent; but, within reasonable limits, we need not fear any ill effect upon the patient or the progress of the labour. Dr. Dewees recommends it even with delicate women; in one case he took away two quarts of blood, and the patient did well. Dr. Davis has taken between thirty and forty ounces; but it will not in general be necessary to abstract so much. Neither ought we in any case to bleed in anticipation of the difficulty, as has been advised.

In most cases of rigidity, fourteen or sixteen ounces rapidly taken from an ample orifice in the arm will be sufficient, and if it make the patient feel faint, so much the better; after which, if she be much fatigued, rest may be procured by means of an opiate; and this will generally be succeeded by a softened, yielding condition of the parts.

Should the venesection only partially succeed, however, or in case it be not desirable to have recourse to it, we may then try the tartar emetic, which I believe was first used in these cases by Dr. Evory Kennedy. It is an exceedingly valuable remedy, perfectly safe, and very successful. It should be given in small doses, so as to excite and keep up a state of nausea, and it may be advantageously combined with a purgative —take for instance the following formula: ℞ Magnes. Sulph. ℥j; Infus. Sennæ ℥viiss; Antim. Tart. gr. iij; Syr. Zinzib. ℥ss. M. capiat cochlearia duo omni semihorâ, vel omni horâ. Dr. Hall, of Montreal,* recommends larger doses, a grain every half hour; but this I have never found necessary, and I can conceive cases in which much depression and prolonged vomiting might be very injurious.

Emetics were recommended by Lowder, and by many others since his time, founded on the observation, that the spontaneous vomiting in labour is almost always followed by relaxation of the os uteri; but as the same benefit results from exciting nausea, it is much better to avoid the shock of vomiting.

Opium has been used to suspend uterine action; but it is far more effective when given after bleeding. Tobacco enemata have been proposed and tried; but their effects are so uncertain and occasionally so formidable, that their use is hazardous, and to be deprecated. Dr. Dewees says that they do not succeed in softening the cervix.

Belladonna was recommended by Chaussier, from its effects in relaxing sphincters: but there are very serious objections against its use. Dr. Rigby states, "for our own part we must confess, that although we have seen this application tried repeatedly, it has never produced the desired effects; but has invariably brought on very troublesome and distressing symptoms, such as sickness, faintness, headache, vertigo, &c."

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* British American Journal, Dec. 1850.

French practitioners are in the habit of using mucilaginous injections, after the recommendation of Gardien, nor is there any objection to them, although I cannot say I have seen much good from them. The hip-bath was tried by Dr. Dewees, but without adequate benefit. Dr. M'Clintock, whose experience is very great, informs me that he used it in the hospital with great benefit, and with no ill consequences.

I believe we shall rarely fail in softening the more simple cases of rigidity by some one or other of these means; and it may be a great question how far any manual or digital interference for the purpose of dilating the os uteri is admissible. Dr. Smellie both recommended and practised it; Drs. Hamilton and Burns advocate it, and also the present able Professor of Midwifery in Edinburgh.

On the other hand, Dr. Murphy, and almost all the English authorities, Dr. Collins and all the Irish, object to any mechanical interference whatever. I think some confusion has arisen from the uncertainty of the amount of force or dilating power to be employed. If this be much, we have evidence enough that it may do injury; if it be little, will it suffice? That a certain amount of dilatation may be effected without injury by passing the finger along the borders of the os uteri, with a very moderate degree of pressure, I know, because in some of the more obstinate cases of simple rigidity I have tried it; and I know also that the pulp of the forefinger, placed firmly at the edge of the cervix during a pain, without any attempt to dilate, seems to favour dilatation by giving a point of resistance in those cases, especially where the pelvis is large. More than this I would not venture to recommend, although it has been practised with benefit;[*] but this much is safe, and may be very serviceable.

But now let us speak of those more obstinate cases of rigidity in which all these remedies have failed after a fair trial, and the failure of which points out that they belong to a separate class, and that other means must be employed.

The rigidity in some of these cases appears to be owing to a natural density of structure; in another and larger class, to be the result of inflammation following previous labour, or disease or violence. There is also a small class in which it results from organic disease of the cervix.

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[*] Dr. Rawson, Lancet, July 23, 1853, p. 86.

In these cases the pains may continue strong and frequent, increasing in force, and assuming the characters of second-stage pains, with voluntary efforts superadded. After a while the pulse becomes permanently quick, the skin hot and sweating, the face flushed, and meantime no progress is made in the dilatation of the os uteri, the cervix feels hard and tight, and the head, covered by the cervix, is forced down into the pelvis, if it be sufficiently capacious. The remedies which act so beneficially in the simpler cases seem to have no effect here, and if relief be not afforded, the case gradually assumes the character of powerless labour, with or without complication.

Now, what is the result if the case be trusted to nature? It may terminate in various ways, all of them very serious.

1. The patient may become utterly exhausted, and die, as in powerless labour, or be carried off by a convulsion before delivery. This happened with one of Smellie's[*] cases.

2. In cases where the pains are vigorous, the cervix uteri, in part or entire, has been torn off. Such cases are recorded by Mr. Scott,[†] M. Steidelè, Dr. E. Kennedy,[‡] Mr. Power,[§] Dr. Lever,[||] Dr. Davis, Dr. Reardon, Dr. Johnston,[¶] and I have seen two myself. These cases, though involving some danger, do not generally prove fatal.

3. Rupture of the cervix may occur spontaneously, and if confined to the cervix, and the pains be good, and the patient not too much exhausted, may terminate successfully; but if the labour have been much prolonged, assistance may be required, and the patient may sink. Dr. F. Ramsbotham relates two fatal cases of this kind.[**]

4. Rupture of the body of the uterus is by no means unfrequent, and of course proves fatal. Several examples of this have been recorded, and are collected in Dr. Trask's paper. In addition to the fearful mortality as regards the mother, I may mention that nearly all the infants are lost.

5. Let me add that, if delivery have been effected by craniotomy, the patient may have sunk so much by the previous long labour, that she may survive but a short time. One of Smellie's cases died in twenty-four hours after delivery.[††]

With these results before our eyes, I need not say that the *prognosis* is very serious. With the best assistance we can render, the results are very doubtful, but left to nature beyond a certain period, the majority of the cases end fatally.

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[*] Cases, vol. iii. p. 205.

[†] Merriman's Synopsis.

[‡] Dublin Journal, vol. xvi.

[§] Ibid.

[||] Guy's Hosp. Reports, Oct. 1845.

[¶] American Med. Journal, April, 1851, p. 342.

[**] Obstetric Med. and Surg., p. 222.

[††] Cases, vol. iii. p. 64.

Unless the previous history, or a careful examination, inform us of previous or present disease, our *diagnosis* will depend upon the fact that time and pains, with the usual remedies, have failed, and that the cervix is as rigid as ever.

Treatment.—When this is the case—*i.e.*, when we find that, notwithstanding sufficient time has been allowed, that the pains have been good, and the usual remedies have been tried in vain, and that the symptoms of powerless labour are setting in, it is clear that we cannot be justified in leaving our patient to the efforts of nature so long as any resource remains.

In such cases it has been found that incision of the cervix, by liberating the head, affords both mother and child a much better chance than any other method. In Mr. Tweedie's case both mother and child were saved.* In Mr. Butler's case the cervix was incised in two labours: one child was saved.† In Dr. Buckminster's case both mother and child were saved.‡ In Dr. Gardner's case the mother was saved, but the infant was putrid.§ In two cases by Dr. Pagan, both mothers were saved.‖ Many other such cases are on record, but these will suffice to show that, by this proceeding, the mother, and frequently the child, may be saved, provided it be not deferred until the patient becomes exhausted; otherwise, as in Smellie's case,¶ the patient may die after delivery.

The two points, then, which require very great care and caution to determine are, 1, whether the case is one which may be terminated naturally or by a milder method; and 2, if not, what is the proper time for operating. I have already stated that the setting in of the bad constitutional symptoms after the failure of the natural efforts aided by the usual remedies, will, in my opinion, indicate that more decisive help must be given if we hope to save the patient; and I should say that the moment we arrive at this conclusion is the proper time for putting it into execution.

The mode of doing so is not difficult; the points of a pair of probe-pointed scissors should be introduced between the head of the child and the cervix, and an incision made, about an inch long, on either side: if necessary, two more at right angles may be added; and I think there is less danger of a mischievous extension of the rent with four than with two. There is generally but little hæmorrhage, and no pain. Great care should be paid to the state of the parts during convalescence.

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* Guy's Hosp. Reports, vol. iv. p. 119.
† London Med. Gaz., vol. xx. p. 589.
‡ Amer. Journal of Med., Oct. 1847.
§ Ibid., July, 1852, p. 127.
‖ Edin. Monthly Journal, Aug. 1854, p. 172.
¶ Cases, vol. iii. p. 211.

Let me add that, contrary to what we might expect, it does not appear that an extension of the laceration to the body of the uterus is very liable to occur.*

I am aware, of course, that great names may be quoted against such a proceeding, but, with great respect, I would say that facts such as I have quoted are of higher authority than great names; and of late years some practitioners of ample experience have concurred in the propriety of the operation. M. Baudelocque advises it, after waiting a sufficient time, and trying ordinary means; Dr. Dewees is in favour of it in such cases; Professor Murphy† prefers it to waiting for the child's death, and then craniotomy; Dr. F. H. Ramsbotham admits that in some cases it may be necessary; MM. Chailly and Cazeaux are in favour of it. Dr. Lever concludes that artificial dilatation is unjustifiable, but that incision is the proper remedy in insuperable rigidity for the purpose of preventing a laceration of the cervix such as he has recorded, and, *à fortiori*, for an alternative of rupture of the body of the uterus.

3. *Excess of liquor amnii.*—It occasionally happens that the secretion of liquor amnii is in excess, most probably in consequence of some inflammatory state of the amnion: at least, the researches of M. Mercier and others seem to favour this opinion. In other cases a considerable quantity of fluid is found between the amnion and chorion, thus adding to the bulk of the contents of the uterus. This state of over-distension involves no danger to the mother, though it certainly impairs the force of the uterus, and so prolongs the first stage. I may add that the child is often still-born or diseased.

Treatment.—We must be cautious in assuming this to be the cause of delay, and temporize until experience has proved that the uterine action is deficient. If necessary, rest may be procured by opium, and if, after that, there is no improvement, and the uterus be unusually large, the membranes may be ruptured; after which the pains become stronger and more frequent. Before we do this, however, we must be sure that the os uteri is dilatable, and the presentation natural.

4. *Toughness of the membranes.*—Generally speaking, the membranes yield to the pressure from above about the time when

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* For more minute details, see the chapter on Occlusion of the Os Uteri, in Churchill's Diseases of Women.

† Dub. Hosp. Gaz., March 16, 1857.

the os uteri is fully dilated; but this is not always the case. They sometimes remain entire until protruded through the external orifice, but in these cases without causing delay; in other cases their adhesion to the uterus is more firm, and they neither break nor protrude, but of course occasion a prolonged first stage, because the liquor amnii which is retained prevents the more forcible contractions of the uterus. A very remarkable case has been recorded by the late Dr. Montgomery, in which extraordinary strength of the membranes resisted powerful uterine efforts for several hours.

Treatment.—The delay should never, on slight grounds, be attributed to this cause, and not unless the pains are active, and the os uteri perfectly dilatable: when no doubt remains, the remedy is obvious—viz., to rupture the membranes.

5. *Absence of the "bag of the waters."*—Occasionally the head is placed in such close apposition to the lower segment of the uterus, that, being kept there by the pains, it covers the os uteri, prevents the formation of the bag of the waters, and deprives the patient of the wedge power in dilating the os uteri; or it may be, as Dr. Inglis seems to think, that the membranes not being detached from the uterine surface around the os uteri, are prevented from protruding. In such cases the dilatation is effected by the head alone, as when the liquor amnii has escaped too early, and the effect is very similar. I have repeatedly seen the first stage of labour prolonged many hours from this cause in women who have had several children, and whose former labours had been very short.

Treatment.—Very little interference is necessary. In some cases we may be able to push up the head (very gently) during an interval between the pains, and so allow the liquor amnii to descend, or, according to Dr. Inglis, separate the membranes around the uteri by the finger, or "Hamilton's bolt." If we cannot do so, we must allow time, and wait patiently, as the delay is seldom inordinate. If, however, the patient should suffer from this cause, I should be inclined to rupture the membranes, provided it be not a first labour.

6. *Premature escape of the liquor amnii.*—This may occur from weakness of the membranes, from violence, accidents, or careless examinations, and as the early dilatation of the os uteri is effected mechanically by the "bag of the waters" acting as a wedge, its absence will delay the operation by making the head of the child the dilating power, for which it is by no means so well suited.

Treatment.—If the pains be active, and the os uteri not rigid, all that is necessary is a little patience, as it is merely a question of time, involving, it is true, longer suffering to the mother, but no danger to her or her child. In these cases, the firm pressure by the pulp of the forefinger against the edge of the os uteri during a pain, will materially shorten the process without any mischief. In all such cases, an early examination should be made, in order that no time may be lost, if the presentation be abnormal.

If the os uteri be undilatable, and with first children it is not unusual under the circumstances, the remedies already recommended for such a state of the parts must be employed.

Obliquity of the uterus.—The uterus may acquire an inclination one way or the other during pregnancy, from different causes, so as to affect the progress of the first stage, by destroying the unity of axis of the uterine cavity and pelvic brim, so that the head of the child is not applied in a right direction to the brim.

Thus the position in which the patient lies during pregnancy may give the uterus an inclination to the right or left, and the relaxation of the abdominal parietes may cause "pendulous belly." I have no doubt that obliquity may cause delay; but it is far less frequently the case than was supposed by Deventer, who first pointed it out to his disciples. Dr. Denman, who objects to Deventer's opinion, remarks, nevertheless, that "it must, however, be allowed that some labours are procrastinated by the mere oblique position of the os uteri." Dr. Wm. Hunter very truly remarks, "As far as I have been able to observe, the mere obliquity of the uterus never occasions so difficult a labour as to require any artificial arrangement to bring the os uteri into a proper situation. In such cases, as in many others, art can do little good, and patience will never fail."

The mal-position of the os uteri will be detected on making an examination; it will be found at one extreme of the transverse diameter of the brim, or close to the sacrum; and when our attention is thus excited, an examination of the uterine tumour will decide upon the existence of the obliquity. The mere deviation of the os uteri from its ordinary situation is not sufficient, because that will soon be altered by the pressure of the pains, if the axis of the uterine cavity be in accordance with that of the brim.

Treatment.—Although I do believe that the completion of the first stage may be delayed by lateral inclination of the uterus, I cannot but agree with Dr. Hunter that little is necessary except patience; the uterine contractions tend, as we have seen, to bring the axes into accordance, and this may be aided by placing the patient on the side opposite to the inclination. I do not think that interference with the os uteri is necessary.

Few practitioners, I fancy, will doubt that, in an aggravated case of anterior obliquity, or "pendulous belly," the deviation from the proper direction must be a serious difficulty, and one that patience alone is not likely to remedy. In these cases it is customary, and very useful, to place the patient on her back, at least till towards the end of labour; but in some cases this alone is not sufficient. "We have found," says Dr. Dowees, "more than once, in cases of extreme anterior obliquity, that it is not sufficient for the restoration of the fundus, that the woman be placed simply on her back: but we are obliged also to lift up and support, by a properly adjusted towel or napkin, the pendulous belly, until the head shall occupy the inferior strait." I believe that this will be sufficient in all cases; but a very high authority —M. Baudelocque—practised further manipulation. In a case of the kind he attended, after placing the patient on her back, he says, "I raised the abdomen with one hand to diminish the obliquity of the uterus; while with two fingers of the other, after having pushed back the child's head very little, I was able to hook the anterior edge of the orifice of the uterus, to bring it towards the centre of the pelvis, where I kept it during a few pains; and then permitting the woman to bear down with the little strength she had left, she was delivered in the space of a quarter of an hour."

There is a certain condition of the os uteri, the result, probably, of some obliquity, although it is not externally perceptible, which causes considerable delay in the first stage. I allude to those cases where, in the progress of the dilatation of the os uteri, its anterior lip is caught between the head and the symphysis pubis, and its retraction prevented. It may also result from the unequal dilatation of the anterior and posterior half of the cervix, as in some cases I have found on examination during a pain, that although the posterior lip was dilated and retracted, the anterior was drawn still more tightly over the crown of the head. However produced, the effect is a delay of some hours in the first stage. Dr. Hamilton was the first, I believe, to call the attention of the profession to this peculiarity.

The remedy is simple: during an interval between the pains, the os uteri is soft and dilatable, and it is very easy with one finger to push the anterior lip over the crown of the head; and having done this with great gentleness, it should be maintained there by steady pressure during the next two or three pains. It will soon be felt retracting whilst contracting, and then it will slip over the head altogether. After this difficulty is removed, the labour will proceed more rapidly to its termination.

When the head fills the pelvis very tightly, it is not easy, nor in some cases possible, to raise the anterior lip, on account of the want of space; and as no force should be used, we are compelled in such cases to trust to the gradual predominance of the expulsive force over the resistance. And when the lip of the os uteri becomes œdematous from the pressure, or inflamed, as is not very uncommon, it will require great gentleness; in fact, if not easily raised, it had better be let alone.

The causes already enumerated may be considered natural ones, which, in general, can neither be foreseen nor prevented; but we are not to forget that delay in the first stage is frequently the result of mismanagement. Thus the use of cordials on the plea of supporting the strength, keeping the room hot and close, putting the patient to bed too soon, encouraging her to make efforts prematurely, injudicious attempts at assistance, omitting to evacuate the urine, &c., will all act upon the labour, and retard its progress. A well-instructed nurse will avoid these mistakes; but we may be called in after the effect has been produced, and then a little common sense will be our best guide.

These causes all act upon the first stage of labour, and although they offer a certain amount of obstruction, and make the labour other than a natural one, none are of such a kind as to prevent its being completed by the natural agents.

Again, we have seen that the delay in itself is attended with little, if any ill-effects to the mother, or to the child; that at most it occasions a degree of fatigue, weariness, and exhaustion (which is soon repaired); consequently, whilst this is a sufficient warrant for endeavouring to remove the cause, it does not justify our attempting to hasten the labour, merely because the first stage is tedious.

CHAPTER VI.

PARTURITION.—CLASS II. UNNATURAL LABOUR.

ORDER 2. POWERLESS LABOUR.

Definition.—The labour is prolonged in the second stage, by causes which act on the uterine power primarily or secondarily, rendering the pains feeble and inefficient, or totally suppressing them. In consequence of the stage at which the delay takes place, certain symptoms arise which render speedy delivery imperative. The pelvis is sufficiently roomy.

We have just seen that delay in the first stage of labour is unattended with serious results to the mother, and very rarely to the child, and we remarked, that although feeble, the pains recur regularly; that the labour advances, though slowly; that the strength is not seriously impaired, though temporary fatigue may be induced; that there is no fever or local inflammation; that the vagina is cool and moist; the evacuation of urine and fæces easy; that there is no abdominal tenderness; and lastly, that even if unaided, the labour will be completed by the natural powers.

SYMPTOMS.—We have now to investigate the effects of delay in the second stage; and we shall find them very different. For a time the second stage may continue without any bad symptoms, even though unusually long, nor can we fix a definite time after which they are developed; I have known them occur after six hours, or not until twenty or thirty hours have elapsed; but in general there are symptoms of constitutional suffering after the second stage has exceeded twelve or fourteen hours.

The pains which had been regular and powerful, are observed after this period to become irregular, both as to recurrence and force; for a while they may be more rapid, and then return less frequently, and evidently with far less effect. They may continue to grow weaker until the characteristic bearing-down effort ceases altogether; and with equal suffering we have the loud outcry and slight force of the first stage, just as though the labour had retrograded. In some cases the character only of the pains is changed, and not their frequency; in others they return at lengthened intervals.

Other symptoms accompany or shortly follow this breakdown of the uterine action: the shivering which was mentioned as a symptom in natural labour, often becomes extremely severe, so as to resemble a slight convulsion; the vomiting becomes more frequent and distressing, and green or bilious matters are ejected; the patient is restless, throwing her arms about, and repeatedly changing her position; the skin is hot, whether moist or dry; the pulse rises and continues from one hundred to one hundred and forty; the tongue is dry, loaded and furred, with sordes about the teeth; the mind is disturbed, fearful and despondent; the vagina is hot, and, as well as the os uteri, tender to the touch; the bland mucous discharge is changed to a yellow or brownish colour, and is sometimes, though rarely, acrid or fœtid; and the pressure of the child's head prohibits the evacuation of the bladder, which should be emptied by the catheter if necessary, or serious evils may result. Dr. Barnes has recorded a fatal case of rupture of the bladder apparently from this cause.*

These symptoms succeed each other much in the order in which they are enumerated, if the patient be not relieved; of course they vary in degree, and in many cases some are absent; but sufficient will be present in every case, when the second stage is excessively prolonged, to characterize the labour. Should the patient be so unfortunate as to obtain no assistance, the case goes on from bad to worse; all the symptoms are aggravated, and new and most formidable ones are added. The vomiting becomes more frequent, and the matters ejected are dark-coloured: the abdomen becomes tender, the jactitation and restlessness ungovernable, the pulse rapid and feeble, the skin covered with cold clammy sweat, the tongue brown and dry; the patient falls into a state of half-stupor, with low muttering delirium, and ultimately death closes the melancholy scene. In all such cases the child is in great jeopardy, and, unless the woman be timely relieved, it will be lost.

That these symptoms do really arise when the second stage of labour is protracted, from whatever cause, will not be questioned by those whose experience among the mismanaged poor has been extensive; and there can be no doubt that they would arise in similar cases among the higher ranks, were not the assistance of art enabled to anticipate them.

Causes.—I do not profess to be able to explain why this series of alarming or fatal symptoms should result from delay in the second, rather than in the first stage of labour; it may be that the first stage is a more local, the second a more constitutional process; that in the latter the different systems of the body (vascular, nervous, muscular, &c.) are more deeply involved, and that a return to their natural state, without the removal of that which occasioned their implication, is impossible; or we may say, if we prefer, with the Arabian writers, that it arises "*ex lege naturæ*," that the process must be fulfilled, or the lives of mother and child be sacrificed. Whatever form of expression we use, the fact remains the same; the symptoms which arise from delayed second stage differ from those in the first, and the case will terminate fatally if unaided.

I have stated that these symptoms arise because of the delay in the second stage, and that they are the same, no matter what be the cause of the delay. It may be occasioned by some peculiar condition of the uterus itself, by obstruction in the soft parts, by deformity of the pelvis; but still we find the same series of symptoms. As the treatment differs according to the cause, I shall in this chapter refer only to those which affect the uterus itself, taking the phenomena which result as the general type.

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* Obstet. Trans., vol. iv. p. 171.

Inefficient or powerless condition of the uterus in the second stage, as in the first, may be the result of various circumstances, such as weak constitution, mental emotion, disease, &c. Women of a *weak constitution*, especially in their first confinement, not unfrequently find the uterine powers fail, after some hours of endurance, and that without our being able to restore them. These are the cases, and these only, in which there is anything to fear from a prolonged first stage; for the exhaustion produced by it, and which in healthy women is of no consequence, may be the cause of inefficient uterine action in the second stage. In women of an irritable nervous temperament, there is also occasionally a failure of uterine powers in the second stage.

Mental emotion, though it has less influence in the second stage than in the first, may nevertheless suspend the power of the uterus; and although in most cases it returns after an interval of freedom from pain, yet in others it does not, and bad symptoms set in.

Disease of the uterus, even when offering no physical impediment to delivery, may yet so interfere with the joint action of the muscular fibres, as to render the pains of little avail. Whilst this is confined to the first stage, it is of little import; but the uterus may complete that stage, and yet be seriously affected by the continuance of the same cause in the second; then the consequences become serious. Thus *rheumatism* of the uterus, which so often simulates the false pains and aggravates the suffering of the real ones, may at length interfere with the forcing pains, so much as to detract from their efficiency, or to render them almost nugatory.

Again, *tumours* in the uterus offer a mechanical impediment to the contraction of the organ, besides their interference with the conjoint action of the fibres, and in some very rare cases they have been known to render the labour powerless. I saw a case rendered powerless by a tumour or tumefaction of the posterior part of the cervix. The crotchet was used, and after delivery I detected this condition of the neck.

Other uterine affections, acting upon a certain condition of the constitution, may render the organ unfit or unable to complete the process of delivery, and the delay being in the second stage, the symptoms already described will be developed, though the time at which they appear varies very much.

I need not say that mismanagement will greatly aggravate this tendency in all cases; and in some, good and judicious care may possibly avert it.

Treatment.—The cause of the bad symptoms of powerless labour is, as we have said, the delay in the second stage; but the reason of our interference is not the delay, but the urgency of the symptoms, so that if the labour should be prolonged, and no ill consequences arise, we should not be justified in interfering further than to remove the cause.

Of course a case of powerless labour, presenting the formidable array of symptoms I have described, will very rarely occur in the hands of a judicious practitioner, as he would previously decide upon the propriety of interfering; but we may be called to consult upon such cases. Our duty then will be to examine the condition of the patient carefully and minutely; the pulse, tongue, head, abdomen, and above all, the genital system, so as to appreciate correctly the present state of the patient; and not this only, but we must calculate, as accurately as possible, from the history of the symptoms, duration of the labour, &c., the rate at which the patient is running down. These investigations are for the purpose of solving three important questions:—1. Whether interference be necessary: 2. What mode of interference is preferable: and 3. The best time for interference.

1. The *necessity for terminating the labour* is grounded chiefly upon the condition of the mother, but also upon the state of the child. If we find the pulse permanently quickened (say 100 or upwards), a degree of fever present, the head not advancing, from the pains having lost their force, with more or less of the other symptoms I have described, we may be pretty certain either that the natural efforts will not terminate the labour, or, supposing that possible, the condition of the patient will be so much deteriorated in the time required, as to render the delivery by the natural powers more dangerous than the employment of art. In forming a conclusion upon this point, the estimate of the "rate of progress" of the labour will be of great value. But even if there be no urgent symptoms on the mother's part, the operation may be necessary as a means of saving the child, especially as it may involve no increase of danger to the mother.

2. The *time at which we ought to interfere* will depend partly upon the rapidity of the accession and increase of the unfavourable symptoms, and partly also upon the condition of the child. For example, if the patient be getting rapidly worse, and the bad

symptoms increasing formidably, the only object then will be immediate delivery: but, on the other hand, if her state be less threatening, demanding less promptitude, then we may take into consideration the condition of the child, and if we have reason to believe it is getting weaker and in danger, the sooner delivery is effected the better. If it be strong, a short delay will do no harm, but if we have reason to believe it dead, then we have only to consider the mother, and the sooner labour is terminated the better.

I have already enumerated in detail the *signs of the life or death* of the child: the most important of which are, the results of repeated auscultation, the movements of the child felt by the mother, and the elastic feel of the integuments of the head. The positive evidence of the first two is quite conclusive—*i.e.*, when the fœtal heart is heard, or the movements felt, there can be no doubt that the child is alive, but their negative evidence is not so conclusive. We may conclude that the child has died during labour, if, after having heard the pulsations of the fœtal heart distinctly, we have found them gradually become weaker, and at length permanently inaudible; if the movements, at first lively and distinct, have ceased; and if the tumour of the scalp has acquired a flabby emphysematous feel, and if the change in the placental bruit has taken place. The peeling of the cuticle is valuable, but rather as a proof of the child having been dead some time. Now, what is the practical use to be made of a knowledge of the child's being living or dead? 1. If the child be dead, there need be no delay; the moment we are satisfied either that the natural powers will not be able to terminate the labour, or that the condition of the mother demands assistance, we may instantly interfere, and we are free to consider the mother's interests only as to the mode of doing so. 2. If the child be living, and the symptoms not very urgent, a short delay may be allowed, so as to give fair play to the natural powers; or if immediate relief be desirable, we should give the child a chance, if possible, by employing means which do not necessarily involve its destruction. 3. As I have said, if we found the fœtal heart growing weaker, so as to evidence danger to the child, this in my mind would be a good ground for delivery by the forceps almost independent of the condition of the mother.

3. The *modes of delivery* at our command are, 1, the vectis; 2, the forceps; 3, the crotchet. We may lay it down as an axiom that that method of delivery is best by which labour can be terminated most easily, and with the greatest safety to the mother and child; and this will be decided by the relative bulk

of the child's head and the size of the passage. If there be space enough between the fœtal head and the pelvis, the vectis may be tried as a tractor; but the forceps is a much better instrument, for if it can be applied without force (and in no other case should it ever be attempted), we hold the power of delivery in our own hands, and unless the pelvis be found too small, or the operator deficient in dexterity, but little time will be lost, and no injury be done to mother and child. Even taking the statistics amongst the poor and worst-managed part of the community, the mortality to the mother is one in thirty-three, and to the child one in five, which is less than that attendant upon other operations.

I have therefore no scruple whatever in recommending a trial with the forceps before using the crotchet, in every case where there is sufficient space, except in those cases where the child is dead.

If the state of the mother preclude all consideration for the child, or if it be dead, then the perforator and crotchet may be used, the great advantage of this operation being the facility of delivery when the bulk of the head is reduced, and its disadvantage, the damage done to the child. I shall speak more in detail about these operations by-and-by.

If the case be from the beginning under our own care, and our interference be well-timed and ably executed, in all probability the patient will recover well; but if she have been neglected and allowed to run down before assistance is rendered, unpleasant consequences may follow, as, for instance, the *nervous shock* may be severe, or even fatal; the patient sinking, twelve or twenty-four hours after delivery, without ever rallying after the operation. Again, from the long-continued pressure of the head of the child upon the soft tissues of the pelvis, inflammation may arise, and unless subdued, may terminate in pelvic abscess, or abscess between the vagina and rectum; in sloughing of the vagina, with or without perforation of the bladder or rectum; or the contusion of the parts may be so severe as to cause the patient to sink; or lastly, peritonitis or hysteritis may be developed somewhat later.

Such serious consequences, which are unfortunately but too frequent, indicate the necessity not merely of terminating the labour by judicious and timely aid, but also of attending minutely to the local condition of the patient for some time after delivery. Especial directions should be given to the nurse to syringe the vagina two or three times a day with tepid milk and water, to bathe the external parts with a weak mixture of spirit and water, and to place between the labia a strip of lint smeared with simple cerate, and if necessary we should satisfy ourselves by a careful examination as to the state of the parts. If much inflammation arise, a large soft poultice of linseed meal, or "stirabout," may be applied over the external parts, and black wash to the vulva.

I must beg of the reader to re-peruse the chapter on Abnormal Convalescence, in connexion with this and some of the subsequent chapters, as the deviations therein described occur most frequently after the more dangerous labours.

Before concluding this chapter, I would wish to allude more distinctly than I have as yet been able to do, to an interesting, though not numerous class of cases, exhibiting the symptoms, more or less intense, of powerless labour, with the exception of the inefficiency of the pains. The pulse is rapid, the patient very feverish, the head may be affected, or the abdomen tender, &c.; yet the labour, though sufficiently tedious to give rise to these symptoms, does actually advance, and may be completed by the natural efforts, but at a serious expense to the mother, and great risk to the child. I was called to such a case some time ago: the patient had been allowed to deliver herself, and she died of the shock in a few hours. The local injury already described is also more frequent after these cases than even after those where assistance has been given. I know not any cases in which the physician has more need of all the tact and judgment which experience only can give, nor any more difficult to describe in a book so clearly as to guide the junior practitioner, than such as these. The natural powers are not inadequate to the delivery, yet bad symptoms are present, the danger imminent, and greatly increased by delay. On the one hand, we have to guard against unnecessary interference, and, on the other, against the evils of hesitation when assistance is required. As it is clear that the possibility of the labour being finished by the natural powers alone is not in itself a prohibition of all interference, I can only repeat that the necessity for our aid, and the time when it ought to be given, must be deduced from a careful estimate of the present symptoms, and the rate at which they have been developed; and if we find that the probable time required for the completion of the labour will be so great as to add to the patient's risk, then ought we undoubtedly to put in requisition all our resources for her liberation.

CHAPTER VII.

PARTURITION.—CLASS II. UNNATURAL LABOUR.
ORDER 3. OBSTRUCTED LABOUR.

Definition.—The progress of the labour is impeded by some mechanical obstruction in the passages, connected with the soft parts, which, by causing delay in the second stage, leads to the development of the symptoms of powerless labour.

Symptoms.—In the last chapter I stated that delay in the second stage of labour gives rise to a certain series of formidable symptoms, no matter what be the cause of delay; and we there considered such causes as act upon the uterus, impeding its action or diminishing its force. In the present chapter we shall investigate certain other causes of delay, such as are found in the soft parts of the passages.

The symptoms in the two orders will be the same, if the amount of delay be equal; but there is this difference from the commencement, that in obstructed labours the uterine action is intact, nay, perhaps more vigorous than usual, but ineffective in proportion to the magnitude of the obstacles. If they be not very great, the augmented force brought to bear upon them may be successful; if they be considerable, delivery may be impossible without assistance; and lastly, in some extreme cases, delivery "*per vias naturales*" may be impossible.

Making allowance for different constitutions, the symptoms developed during the progress of labour will be in proportion to the prolongation of the second stage, as laid down in the last chapter. It will be remarked, however, that some of the causes I am about to enumerate act upon the first stage. They certainly do prevent its completion, and by rendering the progress of the labour mechanically impossible, do really give rise to the unfavourable symptoms, and so far may be taken as an exception to the conclusion, that no evil arises from a prolongation of the first stage. However, I believe that in such cases the first stage virtually terminates before the bad symptoms set in, for I have repeatedly found that where the physical impediment exists at the brim, whether it be a tumour or distortion, the os uteri is fully dilatable, the membranes broken, the character and force of the pains changed as usual, &c.; in short, a transition is observed from the local and general condition of the first stage to that of the second.

Causes. 1. *Minute or imperforate os uteri.*—There are cases on record in which before labour, or even for some time after its commencement, no os uteri could be detected. Mazzoni mentions having observed such, and Dr. Campbell relates two examples: "Both were first pregnancies; in the first, uterine action continued about twelve hours before the os uteri could be distinguished, when it felt like a minute cicatrix. The second woman had regular pains for two nights and a day before the os tineæ could be perceived, and she suffered so severely as to require three persons to keep her in bed. Both patients were largely bled, gave birth to living children, and had a good recovery." I was myself called to a case in which the os uteri was not discoverable until after forty hours of labour, and then it felt about the size of a small crow-quill; notwithstanding the delay and obstruction, however, the patient was delivered naturally of a living child.

As the effect of disease, the os uteri may be contracted, and its opposite edges become adherent, so as to close it partially or completely. Again, the os uteri may be diminished and the cervix rendered undilatable, by cicatrices, the result of former injuries.

Lastly, cases are on record of total absence of the os uteri, without our being able to trace out the cause; some probably are congenital. Under one or other of these classes, observations will be found recorded by Smellie,[*] Wright,[†] Cuffe,[‡] Tompkins,[§] Hatin,[‖] Tweedie,[¶] Waller,[**] Naegelè,[††] Gooch,[‡‡] Lauverjat,[§§] Gautier,[‖‖] Morlanne,[¶¶] Bedford,[***] &c.

The amount of delay will depend upon the resistance, and this chiefly upon the completeness of the closure of the os uteri. When there is a small opening, there is hope that time, pains, and the remedies mentioned for rigidity of the os uteri, may succeed. If these fail, then the remarks I made on that subject apply to these cases. The natural result of such cases, and, *à fortiori*, of those of complete closure of the os uteri, are, 1, exhaustion and collapse; 2, separation of a part or the whole of the cervix; 3, rupture of the uterus.

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[*] Works, vol. iii. p. 55.

[†] London Med. Gazette, 1846, p. 688.

[‡] Ryan's Journal, vol. vi. p. 87.

[§] Lancet, 1831-2, vol. i. p. 749.

[‖] L'Expérience, May, 1839.

[¶] Guy's Hospital Reports, vol. ii. p. 258.

[**] Ibid., vol. iv. p. 120.

[††] Ibid., vol. iv. p. 137, from Naegelè's Thesis.

[‡‡] Lectures on Midwifery, by Skinner.

[§§] Dict. des Sciences Méd., vol. xxiii. p. 301.

[‖‖] Ibid. [¶¶] Ibid.

[***] New York Journal of Med., March, 1843, and American Journal of Med. Science, April, 1848.

If the reader will consult my work on Diseases of Women, he will find the cases given, and fuller details upon the subject.

In cases of so serious a character, a correct diagnosis is of the last importance, and should be made with the utmost care and caution. "We may suspect," says Dr. Rigby, "that the protraction of labour arises from agglutinated os uteri, when at an early period of it we can discover no vestige of the opening in the globular mass formed by the inferior segment of the uterus, which is forced down deeply into the pelvis, or at any rate when we can only detect a small fold or fossa, or merely a concavity, at the bottom of which is a slight indentation, and which is usually a considerable distance from the median line of the pelvis. The pains come on regularly and powerfully, the lower segment of the uterus is pushed deeper into the cavity of the pelvis, even to its outlet, and becomes so tense as to threaten rupture; at the same time it becomes so thin, that a practitioner who sees such a case for the first time would be induced to suppose the head was presenting, merely covered by the membranes. After a time, by the increasing severity of the pains, the os uteri at length opens, or it becomes necessary that this should be effected by art; when once this is attained, the os uteri goes on to dilate, and the labour proceeds naturally, unless the patient is too much exhausted by the severity of the labour."

Treatment.—Our first object is to see what the natural powers will be able to effect; for which purpose the patient must be managed as in natural labour, and allowed to continue her efforts for some time; there is no danger in so doing, as it will be a considerable time before any unpleasant symptom will arise.

If the continued pressure discover the os uteri, but the cervix resist still, then we may try any of the remedies advised for "undilatable os uteri," such as venesection, tartar emetic, &c., and in most cases they will be found useful.

In some cases, when the os uteri is more or less closed by agglutination, although, as Dr. Rigby observes, "the obstacle is capable of resisting the most powerful efforts of the uterus, a moderate degree of pressure against it, whilst in a state of strong distension, either by the tip of the finger or a female catheter, is quite sufficient to overcome it; little or no pain is produced, and the appearance of a slight discharge of blood will show that the stricture has given way."

If these methods fail, we must have recourse to the knife, and make one or more incisions as near the situation of the os uteri as possible. Moscati recommends a number of small incisions around the os uteri, for the purpose of securing its equable dilatation.

It is gratifying to know that this formidable operation is not attended with so much danger as we might expect. In five cases, both mothers and children were saved; in four, the mothers were saved, but not the children; and in two only did death occur after the operation, and in both great delay had been permitted.

2. *Carcinoma or scirrhus of the uterus.*—Strange as it may appear, conception has been known to take place not only when the cervix uteri was carcinomatous, but when it was the seat of open cancer. Zeppenfeld, Siebold, Lachapelle, Oldham, and others, have put such cases upon record. Madame Lachapelle records seven cases, of whom four recovered from the delivery. Of course such a hardened and undilatable state of the cervix will offer a very serious obstacle to the descent of the child's head, and that in proportion to the extent of the disease. In a few instances it has yielded to the pressure, and the child has been born naturally.

I attended myself a case in which corroding ulcer proved a cause of delay for some hours, but just as we were debating the propriety of incising the cervix, spontaneous rupture took place under the pressure of a powerful pain, and the child (still-born) was expelled. The mother died afterwards from the consequences of the rupture, which had extended into the body of the uterus. And more recently, I was consulted in two other cases of malignant ulceration, where conception afterwards took place; the patients went nearly to the full time, and had a natural labour, but sank a few hours afterwards.

Treatment.—Fortunately such cases are extremely rare; but from those who have been most conversant with them, we find, according to Bayle, Cayol, and Lachapelle, that some have terminated without help; others, according to Siebold, have been delivered by version: or, according to Madame Lachapelle, by the forceps and by vaginal hysterotomy. If the cervix resist all the efforts of the uterus, I suppose we must, as a "*dernier ressort,*" have recourse to the knife; but it is for the sake of the child only, as the mother's end will only be hastened by it, and therefore before doing it, we must be sure that the child is alive. If it be not, it would be better to open the head.

3. *Narrow and undilatable vagina.*—In some women the vagina is naturally small and contracted; but this is rarely a serious obstacle to the natural powers, unless with the first child, and the patient advanced in life.

The calibre of the vagina may also be diminished by callosities or cicatrices, the consequences of former inflammation and sloughing, and which, consisting of a semi-cartilaginous substance, may form rings or spirals around the vagina, and offer great resistance to the descent of the child. These obstructions will be detected at once, on examination, by their hard gristly feel, and their form.

Lastly, more or less perfect occlusion of the vagina may be present, owing to the adhesion of its sides, sometimes leaving a portion of the vagina pervious inferiorly, sometimes obliterating nearly its whole length.

The impediment which a congenital narrowness of the vagina offers is overcome by patience and pains, aided by fomentations or injections before unfavourable symptoms arise; but when it is obstructed by adhesions or contractions, this may not take place. The labour is prolonged beyond a certain time, and then the symptoms of powerless labour set in, and on examination, the cause of the delay is sufficiently clear.

But this is not all. My friend, Dr. Doherty, has very justly observed, in a paper read before the Obstetrical Society, "It is very seldom, even when a single and prominent band encircles the canal, that this is the only mischief which has been done; for, generally speaking, we have more or less puckering of the parietes, and not infrequently, as I have already mentioned, communications with the adjoining viscera. The consequence of these changes is, that the canal is less able to bear a forcible dilatation; and if the narrowed portion be permitted to delay the fœtal head too long, a rupture of the vagina above it may occur, even if no breach of surface already exist. But if even a small opening into an adjacent cavity be already formed, it is very likely to be converted into a rent, which throws both chambers into one, constituting one of the greatest calamities which can befal a woman."

Still worse, if possible, is the result occasionally; for abundant testimony is on record, as I have elsewhere shown, to prove that this obstruction of the vagina, when left to the natural efforts beyond a certain time, may give rise to rupture of the uterus, and death.

Treatment.—As in the cases last described, we must wait until experience has proved how far the natural powers are capable of overcoming the resistance. In some cases we find, contrary to our expectations, that after the pressure of the child's head has continued for some time, the stricture yields, and, as it were, unfolds, so as to permit the passage of the child. In other cases, laceration takes place (not without danger), and delivery follows.

Should the parts continue to resist steadily, then we must have recourse to bleeding and tartar emetic, which will very often preclude the necessity of relief by the knife. If they fail in producing benefit within a reasonable time, we must interfere to prevent worse results—either the constitutional symptoms already noticed or local injury.

To avert such a catastrophe, we must have recourse to the knife, if the previous remedies fail; two, three, or more incisions should be made, just through the resisting band, if it be circular; but if the sides of the vagina be adherent, they must be carefully and gradually divided. The pressure of the descending head will dilate the passage. The greatest care must be taken not to wound the neighbouring viscera. The hæmorrhage may be considerable, and occasionally the case terminates fatally.

Should the uterine action be exhausted by the length of the labour, and unfavourable symptoms develop themselves, it may be necessary to terminate the labour promptly by instruments. I am myself satisfied that, in the more aggravated cases of stricture, premature labour or abortion ought to be induced, if we are cognisant of the fact at an early period.

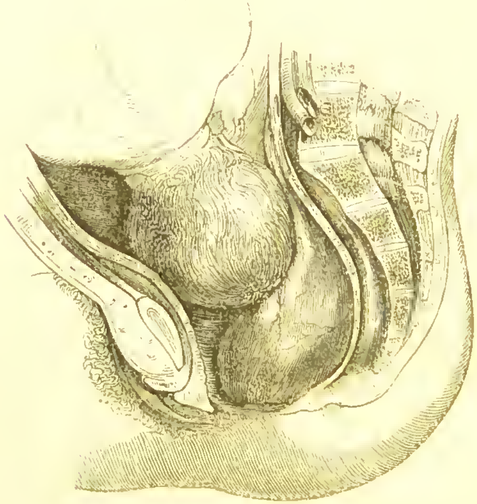
I need not say that in the after-treatment the most careful attention should be paid by the accoucheur himself to the state of the vagina, and as soon as the inflammation and tenderness subside, a bougie should be introduced daily, to guard against the re-formation of the stricture.

4. *Tumours in the pelvis.*—Tumours of various pathological characters may form in the different parts of the pelvis: thus we may have fibrous, adipose, steatomatous, sarcomatous, and scirrhous growths, and they may be situated either behind the rectum, between the rectum and vagina, or in connexion with the proper tissues of the vagina. Again, the os uteri may give origin to a tumour, as polypus. Dr. Denman met with a case of cauliflower excrescence of the os uteri.

This is not the place for the description of these various diseases, which I have fully discussed in another volume. Our object at present is to inquire what is their effect upon labour. The obstruction they offer to the descent of the child's head will depend upon their size, their mobility, and their compressibility. If small, the delay may be immaterial, and the difficulty overcome by extra force; but if beyond a certain size, they may delay the labour so long as to give rise to the unfavourable symptoms of a prolonged second stage, or absolutely prohibit the passage of the child. But this effect of their size is sometimes obviated by their mobility; *i.e.*, the tumour may be pushed to one side, or drawn up out of the way of the child, as in a case published by my friend, Dr. Beatty, in which the tumour was so large, and apparently so fixed, that Cæsarian section was anticipated; nevertheless, at the time of labour it was elevated sufficiently to allow of the birth of the child without any assistance. In the case of a polypus, too, we find that in some cases the pressure of the child's head has detached the tumour, or expelled it without separation, as related by Dr. F. Ramsbotham. Lastly, in cases where the tumour is too large and immovable, it has been found so far compressible, that after some delay and extra compression of the child's head, the labour has terminated naturally.

The chances in favour of the tumour being elevated or pushed out of the way, are increased in proportion as it is high up in the pelvis; next to these the most favourable situation is on one side of the promontory of the sacrum, and the least so, in the antero-posterior diameter. The difficulty occasioned by the size is augmented by the hindrance they offer to the adaptations of the head, and to its successive changes of position.

Fig. 68.



Polypus uteri. (*From Dr. Ramsbotham.*)

When we have reason to believe in the presence of any of these tumours, a most particular investigation should be instituted. The examination, as Mr. Ingleby observes, "should be made in the absence of pain, and (if possible) before the presentation has become engaged in the pelvis, lest the tension which the mass undergoes during strong labour should obscure the diagnosis. If the presentation be in part only below the brim, it may be difficult to determine whether the apparent firmness of the tumour is not owing to obstructed circulation. Whilst making the usual examination '*per vaginam*,' it will be advantageous to pass the forefinger of the left hand into the rectum, with a view of ascertaining more correctly the contents of the tumour."*

Treatment.—If, owing to the moderate size of the tumour, its mobility or compressibility, there is a probability of the natural powers being adequate to the delivery, we have nothing to do but to wait patiently; but if the delay be so excessive as to threaten bad symptoms, or if the obstruction be insurmountable, we must then afford assistance, and the mode will depend upon the size, mobility, contents, or mode of attachment of these tumours.

Thus, if the tumour be moveable, and we see the patient sufficiently early, we should endeavour to raise the tumour above the brim of the pelvis, as was done by Dr. Merriman, during an interval between the pains, and maintain it there during the next pains, so as to allow the head to become engaged in the brim; and to do this the patient should be placed on her knees and elbows, so as to have the influence of gravitation in our favour; if we succeed, the labour will go on regularly; but if, as is most frequent, we fail, we must then try if the tumour be removable. If it be a cauliflower excrescence or a polypus, it will be advisable to pass a ligature around it, and remove it. In the case of polypus this has repeatedly been done with impunity. Other tumours have been removed, as in Mr. Drew's case of one between the vagina and rectum, with success; but this is a much more serious operation, and should not be attempted until we are certain that its bulk cannot be reduced in another way.

Many of these tumours are composed of fluid or semi-fluid matter, and such may be emptied by passing a trocar and canula, or by a free opening with the scalpel; after which the walls of the cyst will subside, and allow of the passage of the child. This operation should always be performed before we attempt delivery by operating upon the child.

If a slight operation upon the tumour is likely to be successful, there cannot be the least doubt that it ought to be preferred, nor do I myself feel that we should be justified in sacrificing the child where there existed any hope of being able to extirpate the tumour.

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* Facts and Cases in Obstetric Medicine, p. 121. I beg to refer the reader to this excellent essay, and to Dr. Merriman's paper in the Med.-Chir. Trans., vol. x., for much valuable detail which I have been obliged to omit; and to Dr. Greenhalgh's paper in Guy's Hosp. Reports, Part I. p. 66.

But suppose the tumour be solid, immovable, and incompressible; then it is clear that our only means of delivery is to act upon the child, and the mode will depend upon the size of the tumour. If it be small, though sufficient to obstruct a labour attended with feeble pains, then perhaps the addition of extracting force by means of the forceps may suffice. These cases, however, are very rare, and we must take care that the force employed do not add to the subsequent risks, by inducing the evil results of excessive pressure upon the soft parts of the mother.

If the tumour be too large to allow of the use of the forceps, or if they have been tried unsuccessfully (extirpation being out of the question), we have then no alternative but the reduction of the bulk of the child by craniotomy, and, if necessary, evisceration. This, however, is so painful an alternative, that it should never be thought of until we are satisfied that nature is inadequate to the delivery, that the obstacle cannot be pushed aside, nor lessened by puncture, nor removed, &c., and that interference has become imperative in order to save the life of the mother.

Some few cases occur in which even craniotomy will not enable us to effect the delivery; in which the pelvis is very nearly filled by a firm incompressible tumour, as in the cases related by Dr. Montgomery, Dr. Shekleton, and others. We have no remedy for such, except by providing an artificial exit for the child, by performing the Cæsarian section; a formidable and very fatal operation, it is true, but which is infinitely better than leaving mother and child to perish. But before having recourse to it, we must be perfectly satisfied that no other means afford a hope of success; and I need hardly add, that none of these serious operations should be undertaken without a consultation, if that be possible.

5. *Diseased ovary.*—The ovary may be enlarged from disease originating previous to or during pregnancy, and not suspended by it. The enlargement is sometimes solid, but more frequently it contains fluid, or matter the consistence of honey. If the disease progress slowly, the uterus, with the ovaries by its side, will have emerged from the pelvic cavity in time to remove the obstacle, which will then be in the abdominal cavity. But in other cases, either from the situation or rapid increase of the ovarian tumour, or by adhesions between it and the neighbouring parts, it is retained in the pelvis, and may offer serious obstruction to the second stage of labour.* "There are two forms of

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* British Med. Journal, May 12, 1860, p. 261.

ovarian tumour," says Mr. Ingleby, "which obstruct the passage of the child. In the one a small cyst in connexion with a very bulky cyst, or else a portion of a large cyst, passes into the recto-vaginal septum, and bulges through the posterior part of the vagina. In the other, and that which occurs by far the most frequently, the whole ovary, moderately enlarged, prolapses within the septum. The descent is peculiarly liable to happen at two periods: the first, near the end of gestation; the second, during labour; the prolapsus being promoted by the relaxation of the soft parts. The changes which the ovary undergoes when long detained in the septum, will depend upon the capacity and yielding state of the parts. If the woman have not previously borne children, it may remain small, and scarcely retard delivery: but under contrary circumstances, it acquires a large size, and nearly fills the vagina. In rare cases, the bulging is said to have appeared at the anterior part of the pelvis. Again, the ovarium, when moderately enlarged, and confined within the abdomen, may alter the course of the gravid uterus in its ascent out of the pelvis, so that the organ can neither preserve its perpendicular direction, nor freely develop itself on the side on which the tumour is situated, and thus the lateral obliquity, as described by writers, is almost necessarily produced. Although this malposition of the uterus may fail directly to obstruct the entrance of the presentation with the brim, the axis of the organ as respects the pelvis is no longer maintained, and labour will probably prove tedious."

A very remarkable case has been published by Mr. Rankin and Dr. Wilson, in which an ovarian tumour occupied the pelvis in two labours, during the latter of which it was pushed above the brim, and the child delivered by turning. In the third labour, there were two tumours above the pelvis, and the child passed between, rupturing one, and was delivered naturally.*

Cases of this kind of obstruction have been published by Dr. Greenhalgh, in which premature labour came on naturally or was induced.†

The observations made upon other tumours in the pelvis are in most respects applicable to enlarged ovaries. There will be delay in the second stage, or the head will be prevented altogether from entering upon this stage, in proportion to the size, immobility, and incompressibility of the tumour; modified in some degree by its situation. But an ovarian tumour is much more likely to be moved out of the way of the child at the time of labour, than any other, and also more apt to give way and burst under the pressure of the head.

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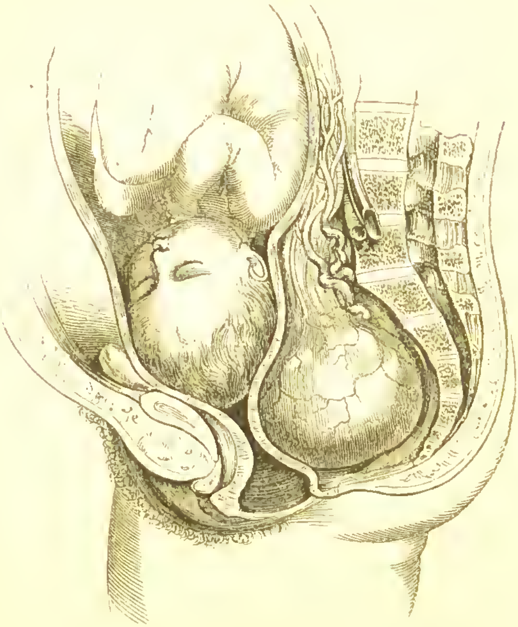
* Glasgow Med. Journal, Jan. 1854, p. 414.

† Guy's Hosp. Rep., Part I. pp. 68, 69, 71, 74, 76.

Fig. 69.



Ovarian tumour. (*From Dr. Ramsbotham.*)

The *diagnosis* is not always easy. If the tumour within the recto-vaginal septum be moveable, elastic, and communicating to the finger a sense of fluctuation, it is probably ovarian: but it is not always thus; it may be hard, not fluctuating, and, in fact, to the touch apparently solid. In such cases the only test we can apply, practically, is puncture. Dr. Litzmann, who has published a valuable paper on this subject, states as the ground of diagnosis between ovarian tumours and fibroid cystic growths, their gradual direction from one sacro-iliac synchondrosis towards the centre, and the possibility of pushing them more or less easily above the brim of the pelvis. Fibrous or scirrhous growths are to be distinguished by their place of origin.

Treatment.—We must first allow time to see whether the tumour may not be displaced by the efforts of nature, and also to estimate the effects of pressure upon it, and we shall have time for this before the bad symptoms appear. If the obstacle be insurmountable by the natural powers alone, and cannot be raised above the brim of the pelvis by the hand, we must then puncture the cyst through the vagina, nor are we to be deterred from this on account of the apparent solidity of the tumour, as many such contain fluid. A long trocar should be used, and plunged quite through the parietes of the tumour. If fluid be freely evacuated, we shall have no further trouble with the labour: if it be viscid, and do not pass freely through the canula, the opening must be enlarged.

But suppose the tumour should really prove to be solid, and cannot be pushed above the brim; it is clear that we cannot attempt to extirpate it in such a case, and we must then act upon the child. Version has been proposed, but it appears to me very unsuitable; it adds much to the mother's risk, without increasing in any degree the probability of saving the child; the tumour would offer even a greater obstacle to the passage of the head reversed, than in its natural position.

If the tumour, though solid, be small, perhaps a little additional power might enable the child's head to pass without injury to mother and child, and in such a case the forceps might be used, but I do not think cases suitable for this instrument are frequent.

If all these plans fail, or are unsuitable, there is no resource (except for those who prefer Cæsarian section) but to evacuate the brain, and, if necessary, the contents of the chest and abdomen, and then extract the child.

Dr. Merriman has collected eighteen cases, and it appears "that *twice* the labour was effected by the pains, unassisted by the art of the accoucheur; but one of these women lost her life, and one of the children was still-born. *Five* times the perforator was used after a longer or shorter duration of labour: three of these women died, another recovered very imperfectly, and one got well. *Five* times the labour was terminated by turning the child: all the children were lost, and one only of the mothers recovered. *Three* times the tumours having been opened, the labour was afterwards trusted to nature: two of these women recovered, but the other remained for a long time in an ill state of health: two only of the children were preserved. In *three* cases the tumours having been opened, it was still found necessary to have recourse to the perforator: one of these women died; one remained in an ill state of health for eighteen months, and then sank under her sufferings; the third recovered.

Thus, in 18 cases, it appears that of the women,

9 died,
3 recovered imperfectly,
6 perfectly,
Of the children, 15 were still-born,
3 were alive.

"Upon the whole," Dr. Merriman concludes, "the evidence we at present possess is more in favour of opening the tumours, when they contain a fluid, than of any other mode of procedure; for of the nine women who recovered more or less perfectly, five appear to owe their safety to this operation, and of the children born alive, two were preserved by the same means."

Dr. Litzmann has collected from various sources forty-seven cases, involving fifty-six labours, in which the process was impeded by ovarian tumours. Of the entire, seven children were born alive, thirty-five were still-born, of fifteen there is no account; of the mothers, thirty-two recovered and twenty-four died. The details are as follows:—In ten cases natural delivery took place, mostly after tedious and severe labour. One child was born alive, of the others nothing is said; four of the mothers died. In seven cases the tumour was pushed above the brim; in three of these turning was performed; in one the forceps were applied; the rest terminated naturally. Two of the children were still-born; and of the remaining five, two speedily died. One of the mothers died. In nine cases, puncture or incision of the tumour was performed: once through the abdominal parietes, twice through the rectum, in the rest through the vagina. In three cases the labour terminated naturally; in three, perforation and extraction was necessary; in one, turning, and in one the forceps. One child was born alive, and five of the mothers died. The forceps were applied altogether in eleven cases, in seven of which they were the only means employed. Of these, two children were still-born, and four mothers died. Turning was performed in eight cases. Embryotomy was performed in seventeen cases; in four after puncture, and in one in artificial premature labour. Of the remaining twelve cases, five were fatal to the mothers. Premature labour was induced in two cases.*

In these cases, the mortality to the mothers was very great; and though in all cases there must be risk at the time and subsequently, still there is reason to hope that a cautious estimate of the value of the different means at our command, and an early and judicious employment of them, will insure a more favourable result. In such cases it must be borne in mind, that whilst the obstacle occasions the necessity for the operation, the time must be decided by the constitutional symptoms, or, at least, that assistance must never be delayed after the symptoms of powerless labour set in.

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* Association Journal, May 27, 1853, p. 469, from Deutsche Klinik, 1852.

With respect to all tumours of the pelvis which have rendered the use of the perforator necessary, I would wish strongly to recommend the induction of premature labour in the next pregnancy, at such a period as shall supersede the necessity of an operation, provided that the size, situation, and density of the tumour continue the same.

6. *Vaginal cystocele.*—I have already spoken of the necessity of keeping the bladder empty, as its distension very often protracts the labour; but the effects may be more serious, if from frequent child-bearing the posterior and inferior supports of the bladder have been weakened, for then it may be caught by the head of the child in its descent, and pushed before it into the cavity. Fortunately such cases are very rare, for their consequences may be most serious. Two very interesting cases, however, will be found recorded by the late Mr. Crosse of Norwich,* one by Mr. Doyle,† one by Dr. Ramsbotham,‡ and one by Mr. Carson,§ and an essay on the subject will be found in the Obstetrical Transactions by Dr. Broadbent.‖ The patient will complain of fulness, tension, a feeling of pressing down and dragging, with a desire to evacuate urine frequently, and of inability to do so. On examination we detect a tumour in front of the pelvis, partially covering the head, and containing fluid. The finger passes easily posterior to the tumour, but not anteriorly, and the catheter cannot be passed in the usual direction, indicating clearly its nature. With care, there is not much danger of an incorrect diagnosis, but if not on our guard, we may mistake it. Dr. Merriman relates a case where the bladder was perforated on the supposition that it was a hydrocephalic head, and Dr. Hamilton used to mention one in his lectures, where it was mistaken for the bag of the waters, and punctured. No doubt, a bladder sufficiently distended and prolapsed must occasion difficulty and delay in the second stage, but the danger to the mother from the rupture of that organ is at least equal to the risk of mischief from the delay.

Treatment.—This double danger renders it necessary that, when we are assured of the nature of the impediment, we should be prompt in our endeavours to remedy it. A male elastic catheter must be introduced, with the point directed downwards and backwards, and if the head have not descended too low, we shall probably be successful in emptying the bladder. The head may also be raised a little with the finger during an interval, to

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* Cases in Midwifery, p. 62.

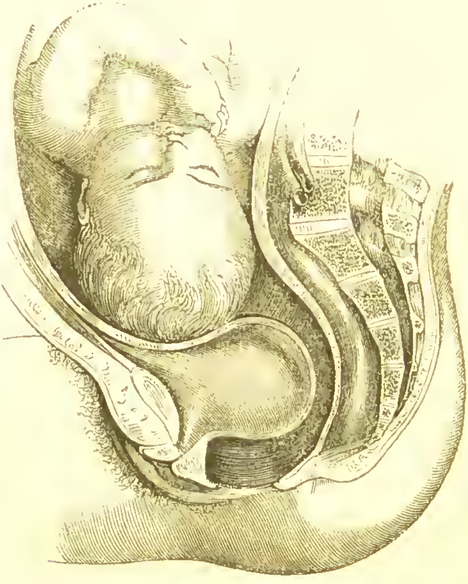
† Dublin Med. Press, No. 95, Lect. 28, 1840.

‡ Med. Times and Gazette, vol. xxxix. p. 3.

§ Ibid., p. 171.

‖ Ibid., vol. iv. p. 44.

Fig. 70.



(*From Dr. Ramsbotham.*)

facilitate the introduction. Even if we succeed, it will be necessary to watch carefully against the effects of the previous pressure; but if we fail, and either the labour be arrested by the obstacle, or the pressure threaten a rupture, our only resource, I believe, is to tap the bladder with a very fine trocar, through the vagina. Let me, however, impress upon my junior readers the necessity of being quite certain of the nature of the case, and of the prolapsed bladder being really an impediment, or in danger of rupture, before attempting so serious an operation.

Should the quantity of urine be moderate, and the pressure not excessive, and especially if the head of the child be small, the case may perhaps be left to nature; but then, after the labour is over, we must immediately evacuate the bladder, and watch the patient carefully.

7. *Calculus in the bladder.*—It is very rare that urinary calculus has been found an obstacle to labour; but such cases are on record. Guillemeau was the first to relate one: the result was contusion, sloughing, and vesico-vaginal fistula. La Gonache performed the operation of lithotomy under similar circumstances, and extracted a calculus several inches in circumference. Smellie relates a case which occurred in the practice of Mr. Archdeacon, in which the calculus was expelled by the pressure of the head, after a long and tedious labour: the patient suffered from incontinence of urine afterwards. M. Dubois detected a calculus in the bladder pressed down by the head of the child; and M. Phillippe, of Rheims, extracted one in the fifth month of pregnancy. M. Monod has published a case of this kind, in which he removed a calculus weighing nearly three ounces, by vaginal lithotomy. It had proved an insurmountable obstacle to the progress of labour, filling the entrance of the vagina. The labour was completed by the forceps, but the child was still-born. The patient recovered well, the urine passing by the urethra the following day.* Mr. Erichsen also relates a similar case which rendered perforation necessary, and afterwards the removal of the stone by vesico-vaginal section.† Through the courtesy of Dr. M'Clintock, I saw a calculus, $1\frac{3}{4}$ by $1\frac{1}{3}$ inches, removed through the urethra of a female six months pregnant. Some sloughing followed, but the woman recovered control over the bladder. In this case, from the extraction of the stone, the head of the child would very probably have pushed it before it, and have thus proved it a serious obstacle.

So long as the bladder and calculus remain above the brim of the pelvis, no mischief will result; but if it project backwards, and be caught by the head, and pushed down before it, the bladder will be seriously bruised, and the labour impeded in proportion to the size of the calculus. A careful examination will show that the tumour is covered by the bladder, and its hardness will indicate its nature.

Treatment.—If the calculus be discovered during the first stage of labour, it may be possible to raise it above the brim, and to maintain it there until the head is engaged, after which there will be no danger; but if we cannot do this, I fear our only resource is vaginal lithotomy; as it is much better to have to deal afterwards with an incised wound than with a laceration.

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* Med. Gazette, March 20, 1850, from L'Union Médicale. Also Crosse's Cases in Midwifery, p. 64.

† The Lancet, Dec. 8, 1855.

8. *Vaginal hernia.*—It is very possible for a loop of intestine to slip down behind the uterus into the "*cul de sac*" between the vagina and rectum, and if it be empty, it will be no impediment; but if it contain a mass of scybalæ, that may form an obstacle to the descent of the head, but one that is never attended with danger, except from the pressure to which the intestine is exposed.

Treatment.—If the hernia can be reduced, it must be done as early as possible; but if not, we may be able to deliver with the forceps. I never heard of its being necessary on this account to lessen the child's head.

9. *Collection of fæces in the rectum.*—This is not a very uncommon cause of delay towards the end of labour, nor is such an accumulation inconsistent with frequent and fluid, but small, evacuations daily. It is easily detected; the tumour is felt in the situation of the rectum, and its irregular form and want of elasticity would almost be sufficient to indicate its nature. It is possible, however, to press it downwards, and then the escape of fæces will put the question beyond doubt.

Treatment.—If proper care have been taken during pregnancy, and the first stage of labour, we shall never be troubled by this obstacle; but if not, we must remedy the neglect by enemata of warm water whenever we detect the state of the intestine; and if, as in some rare cases, this be not sufficient, the fæces must be removed by a spatula or scoop.

10. *Swelling of the soft parts.*—Professor Hamilton was, I believe, the first to notice this state as an obstacle to the delivery of the head. Dr. Campbell observes, "The capacity of the pelvis may be diminished by general tumefaction of its linings, consequent on interrupted circulation, from a long detention of the child's head, or from frequent examination. This cause of protraction is one of no ordinary nature, since, unless the case be promptly and energetically attended to, the result may be calamitous from lesion of structure. Unless a practitioner have had the management of the patient from the commencement of labour, he is apt to view this variety of diminished capacity as arising from original defect in the development of the bones themselves."

Treatment.—Great relief is afforded by venesection; and, if necessary, small doses of tartar emetic should be administered. Dr. Campbell advises the application of the forceps, if there be room; but if the pains be adequate, I would rather leave the labour to the natural efforts, because of the risk of injuring the passages. If the pains be feeble, we must, of course, expedite the delivery.

11. *Perfect hymen.*—Impregnation is quite possible without injury to the hymen: cases have been recorded repeatedly of women in whom the hymen was found perfect at the time of labour. I myself attended three. In most cases the membrane yields to the pressure of the head at once; but it may (as in the cases I attended) offer a long resistance; though I am not aware of its having ever been the cause of powerless labour.

Treatment.—The remedy is very simple; if the hymen do not yield to the pressure of the head after a reasonable time, it must be divided by the scalpel. A very slight incision will suffice, and great care must be taken so to support the perineum, as to prevent the laceration extending beyond the fourchette.

12. *Rigidity of the perineum.*—I mention this among the causes of delay, especially in women of mature age, although I believe it never causes such delay as to give rise to unfavourable symptoms, except when a tough cicatrix has formed after a former laceration.

In ordinary cases of excessive resistance, much benefit will be derived from venesection and tartar emetic, followed by fomentations, or gentle friction with hog's lard. If it be clear from any cause (though such cases must be extremely rare) that the perineum cannot dilate, an incision must be made through the obstacle.

13. *Sanguineous tumour of the labium.*—When this accident occurs before the head is passing through the vaginal orifice, it may speedily assume such a size as will offer a decided obstacle, yet delivery is of course necessary. The question to be decided will be whether to deliver with the forceps first, and then evacuate the tumour, or to open the tumour first and then deliver. I should say that we must be guided by the size of the tumour: if it be possible to deliver without danger of laceration, I should prefer that, and then to allow some time to elapse before incising the tumour. But if it be very large, it will be better to have to deal with an incised wound than a laceration, and we must make sufficient pressure at the time and afterwards, to guard against serious hæmorrhage, as in Dr. Greenhalgh's case.*

Other causes have been enumerated as protracting the second stage, as shortness of the funis, prolapse of the uterus, &c.; but though, to a certain extent, they may have such an effect, yet not so far as to give rise to the symptoms of powerless labour. Prolapse of the uterus at the time of labour can only be partial, and must arise from excessive amplitude of the pelvis: careful pressure around the external orifice will retain it within the vagina, and the child will be expelled naturally. Brevity of the umbilical cord, or its coiling, has also been said to delay the descent of the child, but, I believe, without reason. Those who supposed this, remedied it by dividing the cord, which I believe to be very rarely necessary.

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* Guy's Hosp. Rep., Part I. p. 68.

Symptoms.—It is unnecessary that I should do more than allude to the symptoms which arise, when, in consequence of any of these causes, the labour is delayed in the second stage, as I have fully described them under the head of Powerless Labour, from which they differ in nothing, except that we do not so frequently find the character of the pains changed. It is evident that the fault is not in the want or inefficiency of pains, but in the obstacles opposed to them. The symptoms will then be in proportion to the delay, making due allowance for difference of constitution and temperament, and the delay will be in proportion to the extent of the obstruction, assuming that no interference has been attempted.

For some time (from twelve to twenty hours) after the first stage has been virtually or really completed, the labour will go on apparently favourably; but after this, the pains producing no effect, we find that the patient becomes feverish, restless, and thirsty; the pulse rises, the skin is hot, the tongue dry and furred, and the gums and teeth coated with sordes. In some cases, but not always, the character of the pain is changed; the outcry and suffering increased, but the force diminished and the voluntary efforts suspended.

If the patient be neglected, the unfavourable symptoms increase: the abdomen becomes tender, and sometimes tympanitic; vomiting is frequent; the urine is retained; the vagina is hot and tender; the discharge becomes yellow or brown, and perhaps offensive; violent rigors occur, and the patient is irritable and despondent, and ultimately sinks into a delirious or comatose state.

Prognosis.—In any case to which we are called, our prognosis must depend upon the actual state of the patient, and the possibility of removing the cause, or the facility with which labour may be terminated by instruments. If called early, before bad symptoms are developed, and the cause of delay be one we can remove, the prognosis will be favourable, as far as delivery is concerned, with a reservation as to the results of the operation necessary for the removal of the cause. If the obstacle cannot be removed, and we are obliged to operate upon the child, there will be, in addition to the usual risk of the operation, something additional in proportion to the difficulty of extraction. If we be not called until serious symptoms appear, the shock of any operation will add much to the patient's danger, and our prognosis should be very guarded. In these cases it should be distinctly stated that, although there is danger to the patient if the operation be attempted, there is much greater danger, or perhaps the certainty of death to mother and child, if nothing be done.

Treatment.—For each cause of delay I have mentioned the special treatment necessary. I shall, therefore, now merely recapitulate a few general principles. 1. In no case need we interfere when the obstacle can be overcome by the natural powers within a reasonable time. 2. That the less serious the mode of interference the better; so that, if the natural efforts are insufficient, we should endeavour to push the obstacle out of the way; to puncture it; or to remove it. 3. That if the uterine efforts be vigorous, the mere removal of the obstacle will enable them to complete the labour. 4. That in some cases, besides removing the cause of delay, it is necessary to employ extracting force; and, in such cases, the less violent the operation the better: thus the vectis (if effectual) would be preferable to the forceps; the forceps to the crotchet; and the crotchet to the Cæsarian section. 5. But in our estimate of the risk of these operations, we must not omit the time they occupy, with reference to the condition of the patient; thus the time gained by the forceps may render it more useful than the vectis. 6. When the forceps cannot be used, no false humanity should make us hesitate to destroy the child (I assume, of course, the necessity for an operation) in time to save the mother; because its life cannot be saved; and both it and the mother will be lost if we do not terminate the labour.

CHAPTER VIII.

PARTURITION.—CLASS II. UNNATURAL LABOUR.
ORDER 4. DEFORMED PELVIS.

DEFINITION.—The progress of the labour is impeded by abnormal deviations in the form of the pelvis, giving rise to delay in the second stage, or rendering the descent of the child impossible without assistance, or altogether impracticable. The symptoms are those of powerless labour.

If the reader will have the kindness to turn back to the chapter on Abnormal Deviations in the Pelvis, he will find that I there described the following variations from the ordinary standard: 1, the equably enlarged pelvis (*pelvis æquabiliter justo major*): 2, the equably diminished pelvis (*pelvis æquabiliter justo minor*): 3, special distortions of the brim: 4, of the cavity: 5, of the lower outlet: and 6, oblique distortion. As in that chapter these deviations were described, and the means of diagnosis pointed out, it only remains for us now to consider their effect upon the labour, which I shall do in a few words.

1. The "pelvis æquabiliter justo major" can scarcely be included in the practical consideration of the effect of distortion; but as it does modify the labour, a few words may not be amiss. As the adaptation of the child's head to the pelvis, and the changes observed in its descent, depend upon the combined effect of the propelling force and the resistance, it is clear that if the pelvis be so large as to afford little or no resistance, these changes will not take place; nor is that of much consequence. Further, the absence of resistance will render the labour so rapid as to preclude due preparation on the part of the mother, as in the cases related by Drs. Montgomery and Rigby. In one, a patient of Dr. Douglass, the child was born in the night without waking the mother. Nor are these rapid labours from deficient resistance without inconveniences; the uterus may be depressed to the edge of the vaginal orifice, and even somewhat beyond it, and there is certainly more danger of subsequent hæmorrhage. The only danger to the child arises from the chance of its falling on the ground, when expelled without warning.

Little can be done in such cases, even if we happen to be in time, except to support the external parts, so as to prevent partial prolapse of the uterus, and by pressure over the uterine tumour to guard against flooding. During convalescence, the patient should be kept a longer time than usual in the horizontal position.

2. The opposite extreme, the "pelvis æquabiliter justo minor," may offer very serious resistance to the progress of labour. In general, however, it renders the labour difficult and tedious, but not impracticable by the natural powers. The moulding and adaptation of the fœtal head occupies a longer time, the compression is greater, the pains more violent, and the second stage more prolonged, but the amount of delay varies, and its effects also upon the constitution of the patient.

3. The special distortions of the brim are very important, and it may generally be remarked, that a small special deformity will prove a greater obstacle than the same amount of equable

diminution of size. When the oval of the brim is transposed so that the antero-posterior diameter is the longer, the position of the child's head will of necessity be changed, so as to bring its long diameter into accordance with that of the pelvis. The heart-shaped brim may have no influence upon the head unless the promontory of the sacrum be much projected; then we shall find a corresponding indentation upon the skull of the child, and perhaps a fracture of one of the bones, as remarked by Dr. Michaelis, of Kiel. And not only this, but the head, if prevented from freely entering the pelvis, and if the pains be very violent, and the patient have had several children, may be driven to one side, and the cervix, being unable to resist the pressure, may give way. If the distortion be excessive, it may preclude the entrance of the head altogether.

4. Distortions in the cavity may be merely a continuance of deviations in the brim, or they may be limited to the cavity; in the latter case we may find the head enter the pelvis with tolerable facility, and descend in the usual manner, until it arrives at the impediment. If the sacrum be too straight, there will be danger of the head being driven through the perineum for want of the forward direction which is ordinarily communicated to it by the curve of the sacrum: on the other hand, too great curvature of the sacrum may be a serious difficulty, even insurmountable without assistance, or if overcome it may exert injurious pressure upon the skull of the child. Exostosis of the sacrum, or fibrous tumours growing from the periosteum, will prove an obstacle in proportion to their size: if small, it may be overcome by the uterine efforts alone, or with assistance: if large, it may be incompatible with the delivery of a living child, or even a mutilated one. And it should be always remembered that these tumours increase really though slowly, and that the impediment they offer to the passage of the child in one labour is a deficient measure of the obstruction they will give in a subsequent one.

5. Distortions of the lower outlet may depend upon those in the upper part of the passages, or, which is rare, they may occur alone. The latter consist generally in an approximation of the tuber ischii, or narrowing of the pubic arch, or in anchylosis of the coccyx. If the pubic arch be narrowed, the antero-posterior diameter of the lower outlet is virtually lessened, because the head cannot fill the arch, but is thrown backwards upon the os coccygis. If the coccygeal joint be anchylosed, that will also diminish the antero-posterior diameter of the outlet; and if it be not broken by the expulsive force, it may indent or fracture the

bones of the cranium. When the pelvis is funnel-shaped, the resistance will not be felt until the head is at the lower outlet, and it may then require assistance.

6. Oblique distortions of the pelvis offer great obstruction to the passage of the child, and although, if slight, a modification of the usual adaptations of position may allow its descent, yet in many cases it is requisite to interfere and terminate the labour artificially.

So far I have merely sketched the kind of influence which the various deformities are calculated to exert upon the labour; but another most important consideration remains, viz., the amount of the difficulty. A due appreciation of the limitation caused by the distortion is absolutely necessary to the practical management of such cases, and in forming our judgment we must take into account the relative as well as the positive size of the apertures or cavity; for although they should be much reduced, yet if the fœtal head be very small, there may be comparatively little difficulty: and, on the other hand, if the head be large, and the sutures ossified, a very slight diminution in the usual capacity of the pelvis will offer great obstruction. In a practical point of view, we may make three degrees of distortion: first, where the pelvis is sufficiently reduced in size to offer an amount of difficulty which in some few cases may be overcome by forcible pains, if time be allowed, but which generally require extracting force in addition, there being space enough to allow the use of the forceps. Secondly, where the head is unable to enter the pelvis, or having entered, is tightly wedged in the cavity or impacted, as it is called. In these cases there is not space enough to admit the forceps, nor, if they could be introduced, would the head bear the compression necessary to enable us to extract the child alive; there is no resource but to evacuate the contents of the cranium. Moreover, there are cases where it is just possible to extract a mutilated child, but with the almost certain destruction of the mother: such cases do not belong to this class, but the next. Thirdly, there are very rare cases of extreme distortion, where the canal of the pelvis is so reduced that it would be impossible to extract even a mutilated child.

It is not easy to name the actual diameters answering to each of these classes, because, as I have already observed, the size of the pelvis must always be considered relatively to the child's head. But this much may be stated, that a living child cannot pass through a pelvis whose small diameter is less than three inches. M. Le Roi fixes upon 3¼ inches, Drs. Osborn and Aitken 3 inches, Dr. Jos. Clarke 3½, Dr. Burns 3¼, Dr. Ritgen 2, Dr.

Busch $2\frac{1}{2}$ to 3 inches, as the smallest diameter. It is clear, then, that unless there be a space of full three inches, it would be useless, probably injurious, to use the forceps. In such cases Sir James Simpson proposes to turn the child; and if we are certain of the exact diameter, it may be applicable occasionally, but as a general rule its propriety is not as yet established. In the majority of cases, if it be under this, the case will belong to the second class, in which the perforator and crotchet must be used, provided that there be space enough for the extraction of the child after mutilation. Dr. Osborn states that one inch and a half diameter will be space enough for this purpose; M. Baudelocque conceives that craniotomy is inadmissible when the diameter is only an inch and two-thirds; Dr. Dewees when it is less than two inches; Drs. Hull and Burns think that it may succeed when it is an inch and three-quarters; Drs. Gardien and Hamilton when it is an inch and a half; and Dr. Davis when it is one inch. We must not forget the safety of the mother in our measurements. It may be possible to extract a mutilated child through the smaller of these diameters, but it would be at the expense of the mother's life; and I feel satisfied that if it be below two inches, the case will come under the third class, and our only remedy be the Cæsarian section.

If deformity be suspected, an external as well as an internal examination should be carefully made: if we can reach the promontory of the sacrum and the presentation, we can then estimate the relative size of the head and the brim: if the presentation be beyond reach, we may still be able to ascertain the distance between the sacrum and pubis with tolerable accuracy. In addition, there is a peculiarity about the first stage of labour. "Besides the general appearance of the patient," says Dr. Rigby, "we frequently find that the uterine contractions are very irregular; that they have but little effect in dilating the os uteri; the head does not descend against it, but remains high up; it shows no disposition to enter the pelvic cavity, and rests upon the symphysis pubis, against which it presses very forcibly, being pushed forwards by the promontory of the sacrum." There is less difficulty in detecting the disproportion in the cavity or lower outlet, as it is within reach: and on examining during a pain, we find that no progress is made, and during an interval we can perceive that the head is larger than the passage it has yet to traverse.

Symptoms.—If the labour be allowed to continue beyond a certain time, we shall have all the constitutional symptoms of powerless labour because the delay is in the second stage, really or virtually. It is true the head may not be able to clear the os uteri, on account of the obstruction at the brim, but the os uteri becomes softer and dilatable, the pains forcing, and the cry suppressed; all marking the transition from the first to the second stage, and it is never until after this change that bad symptoms set in.

But besides these constitutional symptoms, which I need not recapitulate, other effects not unfrequently result, even where we are successful in delivering the patient. The long and forcible pressure of the head of the child against the soft parts at the brim and in the cavity may be followed by inflammation and sloughing. Thus the lower part of the uterus and the vagina may be seriously injured, and if the slough be deep, the bladder or rectum may be perforated. I have already pointed out the possibility of rupture of the uterus.

The child, too, may suffer considerably: if the head enter the brim and be much compressed, its life may be sacrificed; or partial pressure on any part may fracture one of the bones of the cranium, or give rise to inflammation or sloughing of the scalp.

If the os coccygis be anchylosed, so as to offer a decided obstacle to the passage of the head, it may be broken by forcing it backward, as in Dr. Summers' case,* rather than risk the loss of the child.

Treatment.—If the distortion be slight, it is possible that the extra force which will be exerted may be sufficient after a longer time for the expulsion of the child, and a fair trial should be given. But if the disproportion be so marked that it is evident that the child cannot pass without assistance, or if unfavourable symptoms are present, we ought to lose no time in determining by the degree of deformity to which of the classes the case belongs, and acting accordingly. If it come under the first, and there be space enough, we may try the forceps; if under the second, version or craniotomy, and, if necessary, evisceration, will be our only resource; if under the third, the Cæsarian section. I would caution my junior friends against coming to a conclusion and acting upon it without a consultation.

The greatest care will be necessary after delivery to guard against the consequences I have mentioned. Vaginal injections of warm water should be used twice a day, and externally fomentations and poultices, if necessary. I have found great benefit from the exhibition of small doses of calomel and opium at moderate intervals, or of a full dose of opium at bed-time in these cases.

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* Ed. Monthly Journal for Oct. 1850, from American Journal.

I shall now proceed to consider in detail the operations to which I have as yet only slightly referred.

CHAPTER IX.

OBSTETRIC OPERATIONS.

1. INDUCTION OF PREMATURE LABOUR.

Very little need be said as to the importance of obstetric operations: the danger to the mother and child, the circumstances under which they have to be performed, and the little time which is allowed for reflection, or consultation, all point out the absolute necessity of our being prepared beforehand for any case which may occur. If any further inducement were required, I might add, the influence which a successful or unsuccessful operation has upon the reputation of a practitioner, or refer to the fact which the periodicals attest, that a surgeon may be indicted for the results of his operations. But I prefer supposing that a conscientious feeling of our responsibility in undertaking the charge of a case, will be the strongest inducement to the acquisition of that knowledge which is the safeguard of those who confide in us. It is, I believe, an axiom, in which I fully concur, that no operation should be attempted without a consultation, if it be possible to obtain one.

In estimating the dangers of any operation, we must always take into consideration the prevalence of any epidemic. If, for example, puerperal fever or erysipelas be epidemic, the danger of any operation is increased incalculably.

Obstetric operations may be divided into three classes: 1, those which are *not intended* to injure the mother or child, as the induction of premature labour, version, the use of the vectis, and the forceps; 2, those which involve the destruction of the child, but which are *not intended* to injure the mother, as craniotomy, and the cephalotribe; and 3, those in which danger is involved to both mother and child, as the Cæsarian section. I have said, "not intended to injure," because I would not mislead my junior readers, by leading them to suppose that *any* operation is without danger to both mother and child. They are all dangerous, but in different degrees, as we shall see by-and-by, and it should be our earnest endeavour in all cases to limit ourselves to the safest practicable operation.

Now let us examine each in detail.

1. THE INDUCTION OF PREMATURE LABOUR for the purpose of saving the life of the infant, of its mother, or of both, though of comparatively modern origin, is an operation of great value in certain cases, and it is one of the few instances of an improved science augmenting the number of operations.

There would appear to be, in the minds of all men, a repugnance to interfere with the natural progress of those great phenomena which ordinarily run a definite and uniform course; and in the present case this objection is increased, because the proposed interference is to remedy one irregularity by another. Accordingly, the first consideration has always been, not the *usefulness*, but the *morality* of the operation. Dr. Denman states* that Dr. Kelly informed him "that about the year 1756 there was a consultation of the most eminent men at that time in London, to consider the *moral rectitude* of, and the advantages which might be expected from, this practice, which met with their general approbation." The conclave decided in favour of the morality of such interference, and shortly afterwards the operation was successfully performed by Dr. Macaulay. Subsequently, Dr. Kelly "practised it, and among other instances, he mentioned that he had performed this operation three times upon the same woman, and that twice the children had been born living." So numerous, and, upon the whole, so successful, have been the instances in which it has been tried since Denman's time, that it has taken its place among the regular obstetric operations in the various systems of British writers and teachers.

Dr. Denman's remarks upon the propriety of the operation, as to morals, are so conclusive, that I may be excused if I quote them: "With regard to the morality of the practice, the principle being commendable—that of making an effort to preserve the life of a child, which must otherwise be lost, and nothing being done in the operation which could be injurious or dangerous to the mother, but, on the contrary, a probability of lessening both her danger and suffering—I apprehend, if there be a reasonable prospect of success, no argument can be adduced against it which will not apply with equal force against any kind of assistance at the time of parturition; against inoculation, or medicine in general: and, in fact, against the interposition of human reason and faculties in all the affairs of life."

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* Introduction to Midwifery, p. 318, 7th ed. For more minute details and references about these operations, I beg to refer the reader to my Researches on Operative Midwifery.

In France, however, the proposed operation was by no means so frankly received nor so readily adopted. Certain doctrines of the national Church, or at least the interpretation of them by the Doctors of the Sorbonne, touching the importance of fœtal life, seem to have aggravated the risk of the operation, and to have deterred professional men from making the attempt. The great name and extended influence of Baudelocque were opposed to what he considered (in the case supposed) a crime; and a celebrated teacher, recently deceased, Capuron, has stigmatized it as "*un attentat commis envers les lois divines et humaines.*" Even so late as 1827, on the occasion of a memoir presented by M. Coste, demanding if it would be allowable to bring on labour prematurely in females labouring under aneurism of the heart, the Académie Royale de Médecine pronounced the question "*inconvénient et presque immorale.*" It is said, however, by M. Sue, that M. Petit ranged himself on the side of the advocates of the operation, and since then it has been recommended and practised by Stolz, Ferniot, Paul Dubois, Dezcimeris, Burckhardt, Velpeau, Figueira, Coste, &c. I am happy to see, also, that in a report recently made to the Académie de Médecine, by M. Cazeaux, in the name of a commission, it is declared that the operation is not immoral, but justifiable, as being less fatal to the mother, and offering a mode of delivery in contraction of the pelvis, certain hæmorrhages, and tumours which are irreducible and irremovable.*

The objections of the French authors may be thus summed up:—

1. It is immoral. 2. It is almost impossible to determine the exact relations between the head of the child and the pelvis. 3. The manœuvres necessary for exciting labour are highly dangerous. 4. The uncertainty of all women as to the period of their pregnancy. 5. The difficulty of dilatation of the os uteri at the seventh month. 6. The danger of subsequent disease. Each of these objections will be answered as we proceed. It is quite evident, as M. Marinus observes, that these writers had in view the "accouchement forcé" performed at the seventh or eighth month—a different operation, and one perfectly unjustifiable at so early a period.

It has been recommended and practised in Germany by Weidmann, Mai, Siebold (four times), Schilling (once), D'Outrepont

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* Journal des Connoiss. Med.-Chir., 29 Fév. 1852, p. 136.

(twice), Riecke (twice), Haase (twice), Falco (three times), Vezin (three times), Mende (four times), Betschler, Froriep, Wenzel, Spiering, Ritgen (thirty times), Carus (twice), Kluge (twenty times), Reisinger, Busch, Naegelè (once), Seulen (once), Neumann (once), Spoendli (once), Hayn (once), Mampe (five times), Rosshirt, Kilian (three times), &c. &c.; but opposed by Stein, Osiander, sen., Bernstein, Ebermaier, Gumprecht, Piringer, Joerg, &c.

In Italy it seems to have met with less opposition; or, at any rate, less aversion has been expressed. Successful cases have been published by MM. Ferrario, Billi, Lovati, Bongoianni, &c. &c.

Paul Scheel in Denmark, Solomon de Leyden and Professor Vrolik in Holland, and M. Marinus in Belgium, have each advocated the practice.

So much for the history of this operation, and the difficulties attendant upon its introduction into practice.

As to the origin of it, all writers are agreed in attributing it to the following circumstances:—It has not unfrequently happened that the life of a seven or eight months' child has been preserved by accidental premature labour, in cases where the birth of a child at the full term had been previously found impossible from pelvic distortion. From the complete success of such cases, as regards both mother and child, it was inferred that premature labour, artificially induced, might, in certain cases of pelvic deformity, be employed to supersede an operation (craniotomy) which involved not only the destruction of the child, but considerable risk to the mother. The proposal was not, it must be remembered, to deliver the fœtus artificially, but merely, as was stated by Ritgen, "to communicate a slight but certain impulse," by virtue of which the process of parturition may be carried on and completed by the natural powers.

The reasoning of Dr. Denman appears to me conclusive, as to the "moral rectitude" of the operation; the next question, therefore, is as to its *safety* to the child and the mother, confining ourselves for a moment to the consideration of the cases originally proposed to be benefited by the operation.

It is perfectly established that a fœtus is "*viable*" at the completion of seven months of utero-gestation, and many instances are on record of children born at that period living to a good old age. M. Chaussier (of Dijon) and his wife were both seven months' children; his Majesty George III. was also a seven months' child; and M. Foderè relates the case of the wife of a judge, whose pregnancies always terminated at the seventh month. Examples of "viable" infants born at an earlier period are likewise to be found; but I beg to refer to the able work of Dr. Montgomery for further details; concluding, from all the evidence we possess of the viability of seven months' children, that premature labour, accidentally or artificially induced, at the completion of the seventh month, does not involve danger to the child from the immaturity of its growth merely.

As to the actual risk of labour to the fœtus, as ascertained by an estimate of facts, I may adduce the following testimony:—

Of twelve cases mentioned by Denman, the majority of the children were saved. Mr. Barlow reports seventeen cases—six children were still-born, five died a few hours after birth, and six lived. Of Dr. Merriman's ten cases, four children were saved. Dr. Merriman, jun., mentions forty-six cases—sixteen children lived, and all the mothers recovered. Dr. Conquest says, that out of nearly one hundred cases, about half the children were born alive. In Mr. Gregory's case, the child was born alive, but died subsequently. In Dr. Collins's case, the child lived. In Mr. Corry's and Dr. Paterson's cases, the infants were saved. Dr. Hamilton states that "previous to the 26th of January, 1836, the author brought on premature labour in twenty-one individuals, on account of defective apertures, viz., in fourteen, once; in one, twice; in three, thrice; in two, four times; and in one, ten times. Of the forty-five infants thus prematurely brought into the world, forty-one were born alive. The death of the four still-born can be readily accounted for." In the practice of Mr. Moir, and Dr. John Moir, premature labour was induced twelve times on six women. Nine of the infants were born alive, and the cause of the death of the three still-born infants could not be attributed to the operation. Of Dr. F. Ramsbotham's ninety-two cases, forty-nine children were born alive. Dr. Lee saved twelve children in thirty-one cases; in several of which the crotchet was necessary after labour had been induced. The child lived in Mr. Hearne's and M. Spoendli's cases. M. Ferrario saved five children out of six; M. Klugè, nine out of twelve; M. Solomon, thirty-four out of sixty-seven; M. Burckhardt, thirty-five out of fifty-two; M. Siebold, two out of three; M. Mampe, four out of five, the fifth being a shoulder presentation.

Dr. Shippan, in his Inaugural Thesis, presented to the Medical Faculty at Wurtzburg, in 1831, has given a summary of ninety cases; seventy-three children were born alive, but eighteen of them died subsequently. According to MM. Velpeau and Kilian, one hundred and fifteen children were saved out of one hundred and sixty-one cases. M. Figueira has collected two hundred and eighty cases from different sources, in which one hundred and sixty-six children were saved.

We may conclude from these different data, that more than half the children were saved, notwithstanding a cause of failure to which I have not yet referred. I allude to the greater frequency of mal-presentations in premature labour, than in labour at the full time. In Dr. S. Merriman's cases, for example, there were eighteen mal-presentations out of the forty-six, only one of which was saved. In ninety-two cases of Dr. F. H. Ramsbotham's, thirteen presented with the breech or lower extremities, and six transverse, making nineteen mal-presentations. In two hundred and forty-three premature cases related by Dr. Arneth, there was one mal-presentation in five, thus confirming the observations of Merriman, Dubois, Cazeaux, M'Clintock, and Hardy, &c. If we could subtract all the cases of mal-presentation, we should find, I doubt not, that the proportion of children lost to those saved by the operation was very much smaller.

There is unquestionably *some risk* incurred by the mother, but not more than by an accidental premature labour. After much consideration, Denman concludes that "it is perfectly safe to the person on whom it is performed." We have already seen that Dr. Kelly performed it three times successfully on one person. Dr. S. Merriman seems to think that its safety was rather over-rated, but he adds, "at all events, the method in question, if carefully conducted, cannot be more hazardous to the mother, perhaps is much less so, than the operation for lessening the head of the fœtus in utero, and it is incomparably less perilous than the Cæsarian operation, or the division of the symphysis pubis." Out of his forty-six cases, not one proved fatal. Dr. Hamilton observes, "The late Dr. Merriman first called in question the safety of the operation; but the cases on which he formed his doubts on this point were evidently cases of accidental coincidence, for the safety of the practice is now fully established." Dr. Blundell concludes his observations by saying, that "with all its faults about it, the practice is of great value, and there are now living in society individuals whose heads have in this manner been preserved from the perforator." Dr. Moir and his son operated above twenty times, and all the mothers recovered.* In Mr. Corry's case, the woman recovered rapidly. Dr. Gregory and Dr. Collins each operated once, with safety to the mothers. Dr. F. H. Ramsbotham has had recourse to this operation sixty-two times, and it does not appear that the mother suffered in any of them. Dr. R. Lee lost three mothers out of thirty-one cases. Mr. Hearne saved the mother. In the numerous cases in which Sir James Simpson has performed the operation, the mothers always recovered. Drs. Sinclair and Johnston have recorded six cases in four patients; two for deformity of the pelvis, and two for dropsy: the two former recovered, the two latter died from disease; five children were born alive.*

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* Ed. Monthly Journal, July, 1851.

The statistical details given by Velpeau and Figueira would justify, I think, a much more unqualified commendation. Velpeau states that it has been performed

In Great Britain	72 times
In Germany	79 „
In Italy	7 „
In Holland	3 „

Making a total of 161 cases, of which number 8 mothers died, 5 of them, however, from causes unconnected with parturition.

M. Figueira has collected 280 cases, of which only 6 mothers died. M. Solomon operated 67 times, M. Klugè 12, and M. Ferrario 6 times successfully. M. Reisinger lost 1 patient in 14. All M. Mampe's patients recovered. MM. Spoendli and Seulen's patients recovered well. Of the 90 cases collected by Dr. Shippan, 7 mothers died. In three of these the operation was performed once; in 2, twice; and in 1, three times.

Dr. Hoffman has collected 524 cases, which he has published in a valuable essay;† of these 271 cases were German, 192 English, 17 French, and 3 American. The following abstract contains some valuable facts: of 147 cases, the youngest was aged seventeen, the eldest forty-four; more than one-half had reached or passed their thirtieth year. Of 258 cases, only 49 were first pregnancies. In 34 cases the operation was repeated three, four, or more times on the same woman. Ergot of rye was given in 45 cases, in 38 of which 23 children were born alive, 15 dead, and 12 died within thirty-six hours. Prepared sponge was used in 70 cases, and 42, at least, were born alive. Puncturing the membranes was resorted to in 180 cases, and of 178 children, 103 were born alive, 12 still-born, and 63 born dead. Out of 120, there were 45 cephalic, and 75 non-cephalic presentations; of these 75, there were 19 cross-births. In 84 cases, labour had to be completed by the forceps in 36, by turning in 18, and by perforation in 11 cases. Of 373 cases, 250 children were born alive, and 123 dead; but in 77 of these latter, the death of the child could have had no reference to the operation. Of 192 of the children born living, 127 continued to live, and 65 had died; 28 in the course of six hours, 6 in twenty-four hours, and the rest at intervals from a day to a year or more.

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* Practical Midwifery, &c., p. 502.

† Neue Zeitschrift für Geburtskunde, vol. xxiii., pp. 161, 222, 371, 436.

We may therefore agree with M. Marinus, that "if these facts be true, it is established that females undergoing this operation incur no immediate danger; and if we push our researches still farther, we shall find that these same females were not attacked by pure lesions of the uterus, as has been advanced; several of them underwent the operation two or three times, with as much safety as if they had been delivered at the full term of utero-gestation."

Thus the first, third, fifth, and sixth objections made by the French are answered satisfactorily.

We have now only to inquire as to the *utility* of the operation, before considering the cases to which it is applicable.

The *positive* utility of the operation has already appeared in the numerical results taken from different authors, showing that more than one-half of the children (all of whom must otherwise have been lost) have been saved, and that but a small proportion of the mothers has been lost.

The *comparative* utility is equally in favour of the operation.

It is peculiar to midwifery operations, that they form an ascending series, increasing in gravity from the simplest to the most severe—no two being equal; and therefore, in considering the suitability or practicability of any one, we do so with the knowledge that if the one we prefer do not succeed, we must have recourse to another more severe and more dangerous. An example will make my meaning clear. If, in any given case, we attempt to deliver with the forceps, but are not able to succeed, we must subsequently have recourse to the perforator; there is no other method, of *only equal* severity with the forceps, which we can try. Or again, if craniotomy and evisceration will not render the transit of the child possible, we have no recourse but symphyseotomy or Cæsarian section.

Thus, the *alternative* of any operation in midwifery is not one of *less*, or even of *equal* danger, but *necessarily* one of a *more serious nature*, and consequently we cannot estimate the utility of any obstetric operation fairly if we consider it by itself; a just appreciation involves a due estimate of its alternatives.

It is to the *alternatives* of the induction of premature labour that I would wish to call attention, as demonstrating very strikingly the *comparative utility* of the practice.

In the cases which have been supposed to demand this operation, there is always a considerable diminution in the calibre of the pelvis from bony distortion, so that it would be quite useless, at the full term of utero-gestation, to attempt the delivery by the forceps; the only *alternatives*, therefore, if we allow pregnancy to be completed, are, the perforator, symphyseotomy, and the Cæsarian section.

Now let us compare the mortality attendant upon each of these operations with the results of artificial premature labour.

1. By the use of the *perforator* not only are all the children destroyed, but extensive statistics have shown that about one in five and a half of the mothers perish, either from the direct effects of the operation, or from the length of the previous labour.

2. *Cæsarian section* is the "*dernier ressort*" of midwifery, involving the utmost danger to the mother and child, and justifiable only when no other chance for either remains. I have collected 450 cases; 230 mothers were saved, and 210 lost, or about 1 in $2\frac{1}{3}$. Of 315 children, 211 were saved, and 104 lost, or about 1 in $3\frac{1}{3}$.

3. *Symphyseotomy* is attended with worse results than Cæsarian section. One-third of the mothers have been lost, and many of those who recovered, suffered severely from the consequences of the operation. One-half of the children were lost.

If, then, to the *absolute* advantages of the operation proposed, be added, the *comparative* gain from avoiding these terrible *alternative* operations, we may form a tolerably correct estimate of the *utility* of the "induction of premature labour."

Having, as I trust, established from facts and testimony the three leading principles of the *morality*, *safety*, and *utility* of this operation, I shall now proceed to inquire as to the *cases in which it is available.*

1. The class of cases for which it was first proposed, and in which it has been most frequently employed, is that in which the diameters of the upper outlet of the pelvis are too much reduced by distortion to permit the passage of a fœtus at the full term, and yet not so much diminished as to prohibit the passage of a fœtus at an earlier but still "*viable*" age. In the words of Denman, "It is under circumstances and in situations preventing the successful use of the vectis or forceps, and just compelling us to the fatal measure of lessening the head of the child, that it may be a duty to propose, on a future occasion, the bringing on of premature labour."

The first step is to endeavour to ascertain the size of the fœtal head at different periods of utero-gestation, after the seventh month; in order that, by adapting the diameters of the deformed pelvis to the appropriate diameters of the fœtal cranium, we may be enabled to fix upon the moment when they are in correspondence for the induction of premature labour. It is of course impossible to do this in any individual case, but an approximation may be attempted, by taking the measurements in a considerable number of cases at the same periods.

The following table has been thus constructed by M. Figueira:—

Age of Fœtus.	Bi-parietal Diameter.	Occipito-frontal Diameter.	Occipito-bregmatic Diameter.
7th month.	2 in. 9 lines.	3 in 8 lines.	2 in. 10 lines.
7½ ,,	3 ,,	3 ,, 9 ,,	3 ,,
8th ,,	3 ,, 1 ,,	3 ,, 10 ,,	3 ,, 1 ,,
8½ ,,	3 ,, 2 ,,	4 ,,	3 ,, 2 ,,
9th ,,	3 ,, 4 ,,	4 ,,	3 ,, 4 ,,

To this kind of calculation it has been objected, that we cannot be quite sure of the exact age of the fœtuses measured; and to the practical use of it, that the female cannot be quite sure of the exact period of pregnancy. That this objection has a certain weight, must be admitted; but that it is sufficient to prohibit the operation I cannot believe, for it may always be obviated in practice *by assuming the longest possible period of pregnancy*. If, for example, a patient imagine that she is six months pregnant, but that she may be six and a half, by calculating for the six and a half months, we shall have assumed the largest size to which the fœtal head can have attained; and if labour be not brought on till seven months and a half, we shall also have secured a fœtus of the "*viable*" age.

Ritgen has made another series of calculations which have led to the following practical adaptations:

He says that labour may be induced at the

	In.	Lines.
29th week, when the antero-posterior diameter of pelvis is	2	7
30th ,, ,, ,, ,,	2	8
31st ,, ,, ,, ,,	2	9
35th ,, ,, ,, ,,	2	10
36th ,, ,, ,, ,,	2	11
37th ,, ,, ,, ,,	3	0

There is a very slight difference between the tables of Figueira and Ritgen, which may be allowed for in practice. The compression of the fœtal head will also render its diameter less than the subsequent measurement would lead us to suppose.

It will be at once observed that there are two measurements of the pelvis which limit the operation: if the pelvis exceed the measurement, the operation is uncalled for; and if less than the least, it will not succeed in saving the child. The smallest of these diameters appears to be about two and a half inches, and the greater three and a quarter. If the pelvis, in its sacro-pubic diameter, be less than the former, a "*viable*" child will not pass; and it is generally admitted that a living child may be propelled through a pelvis whose antero-posterior diameter is three and a half inches. The opinions of different authors accord pretty accurately with this calculation.

Another difficulty still remains, which has been put forward as a very serious objection by the opponents of this operation; and that is, the uncertainty of ascertaining the exact diameter of the pelvis in the living subject. Various mechanical contrivances have been proposed by Aitken, Coutouly, Baudelocque, Asdrubali, Chaussier, and others (of which I have spoken in a former part of this work); but in this country they could rarely, if ever, be employed. Nor do I think them necessary; a well practised finger is, after all, the best pelvimeter, and will yield sufficiently accurate information. But we may go further; for by the aid of chloroform the entire hand may be passed into the pelvis, and a direct measurement obtained by comparing the breadth of the hand across the knuckles with the antero-posterior diameter of the brim. But giving the utmost force to this objection, to what does it amount? As Velpeau justly observes: "If the pelvis be wider than we thought, premature delivery (at or after the seventh month) is accomplished without risk. If, on the contrary, the narrowing be more considerable, the fœtus will certainly perish; but then, had no operation been attempted until the full term, the fœtus would equally have been lost, and the mother would have run greater risk." Besides, much information may be derived from the history of the previous labours of the patient; for it is rarely, if ever, for the first child that the induction of premature labour is proposed. Dr. Merriman remarks, "that the use of the perforator in a former labour is not *alone* to be considered as a justification of this operation." This is undoubtedly true in the present uncertain state of opinion concerning the use of the forceps and crotchet, inasmuch as the latter instrument is frequently used where there is no distortion. But if we are convinced that the perforator was used from the in-possibility of otherwise delivering the patient, it might then be an adequate reason; and if it further appeared that her labour had been thus terminated more than once, and for the same reason, the operation would then seem to be imperatively required, and I think that we should be perfectly justified in refusing to undertake the case, unless the patient consented.

I have now answered all the six objections put forward by the French, as fairly and completely as our facts permit.

2. *A narrowing of the transverse diameter of the lower outlet*, as it offers a fixed impediment to parturition, may be an equally valid ground for the induction of premature labour.

3. *Exostosis, or fibrous tumours of the pelvis*, if they offer an impediment to the delivery of a child at term, or at the earliest viable age; as they are solid, and cannot be removed by any operation, will evidently justify the induction of premature labour, or abortion, for the purpose of avoiding the Cæsarian section. Some of the cases related by Dr. Merriman would appear to confirm this conclusion, and the authority of Dr. Ashwell and his practice are in favour of it. Mr. Ingleby concludes that "premature labour may with great propriety be proposed on pregnancy recurring, assuming the delivery of a living child at term to have already proved impracticable, the tumour to remain unchanged, and its excision not deemed expedient."

4. When the *uterus* is the seat of *fibrous tumours*, and impregnation takes place, certain morbid changes occur, involving danger to the mother. "The tumours soften during the latter months; the increased vascular supply leads to inflammation; unhealthy and imperfect suppuration is established in them, and death occurs soon after parturition." This being the experience of Dr. Ashwell, he has proposed "the induction of premature labour *before that period when the tumours shall be subjected to pressure and contusion from the firm, large, and unyielding gravid uterus.*" Before we act upon this suggestion, however, we must be pretty certain that such pressure is likely to take place, and that the case really demands so serious a remedy. Mr. Ingleby has some valuable observations on this subject.

5. In the cases I have supposed, the safety of the child is the great object of the operation; and they are limited, therefore, to those patients in whom the pelvis, though deformed, is still large enough to permit the passage of a "*viable*" child. But there are cases where *the distortion is so great as to render the passage of a seven months' child impossible*, and others still worse, where *no reduction of a viable child's bulk will enable it to pass.*

I do not see why abortion should not be induced at an early period in such cases. This question was answered affirmatively by Dr. W. Hunter in 1768, and a similar approval has been expressed on the Continent by Foderè, Marc, Velpeau, Stolz, Jacquemier, Chailly, Cazeaux, and Spiegelberg and Scanzoni. The life of the child must inevitably be sacrificed, and the safety of the mother alone regarded; and surely, after the calculations I have adduced, it cannot be pretended that Cæsarian section, the *alternative* in these cases, offers such a chance to the mother and child as would justify our preferring it. "When the pelvis is known to be distorted," says Dr. Aitken, "so as to render the birth of a living child impossible, is it not lawful and proper, to prevent the dangers of embryotomy, to induce early abortion?"

An objection to this extension of the operation has been made by Dr. Merriman and others, on the score that it would be "opening a wide door to the dreadful abuse of the operation." That, in short, by multiplying the examples of inducing premature labour or abortion, we should run the risk of its being performed unnecessarily or for wicked purposes. But so may the fact of its being performed at all, and so may the practice of using ergot of rye for the purpose of exciting uterine contractions. I do not, in truth, see any force in this objection, for such cases are extremely rare; nor do I anticipate any such prostitution of their power on the part of the members of our profession; and beyond the profession, the operation is not likely to be much known. It will, of course, be necessary that the case be thoroughly investigated by more than one person, and the time appropriately chosen. Mr. Radford, of Manchester, has suggested that by combining craniotomy with the induction of premature labour, in those cases where we are called too late for the fœtus to pass even at an early period, we may avoid the Cæsarian operation.

6. In certain cases of *rupture of the uterus* the cause is almost entirely mechanical. There is some narrowing of the upper outlet, perhaps a projection of the promontory of the sacrum, offering an obstacle to the ready descent of the fœtal head, which is driven forward with great force by the uterine contractions. Under such circumstances, the head may be pushed to one side, and if the tissues be not very firm, it will be driven through them into the cavity of the peritoneum. Recovery from such an accident is very rare, but nevertheless it has occurred; and if the woman become pregnant subsequently, a premature delivery may save both mother and child. As the best argument I can employ in favour of this operation in such cases, I may mention that it

was adopted successfully by Dr. Collins, when Master of the Great Britain Street Lying-in Hospital. The patient had recovered from rupture of the uterus, and became again pregnant. She was admitted into the hospital in the seventh month of pregnancy, and the membranes were ruptured on the 4th of March, 1832. Labour came on on the 7th, and was completed in ten hours. The patient was delivered of a living child, and recovered. The child, however, lived but two days. The case is perfectly illustrative of the advantages which may be derived from the operation in this class of cases. The mother was saved, and the child at birth appeared likely to live; its death does not seem to have resulted either from its early age or from the labour.*

7. In certain cases of *cicatrised vagina*, when the obstacle is extreme and very rigid, and when it is not discovered until pregnancy has occurred, the operation is quite admissible at any period, inasmuch as it would be very doubtful whether the operation for occluded vagina ought to be undertaken whilst the patient is in that condition; and the risk of rupture of the uterus, if we leave the case to nature, is very great. Dr. Oldham has recorded a successful case of this kind, and others have related many cases in which the patient was lost from neglect of this operation.

8. Dr. Denman observes, " There is another situation in which I have proposed and tried with success the method of bringing on premature labour. Some women who readily conceive proceed regularly in their pregnancy till they approach their full period, when, without any apparently adequate cause, they have been repeatedly seized with rigors, and the child has instantly died, though it may not have been expelled for some weeks afterwards. In two cases of this kind I have proposed to bring on premature labour when I was certain the child was living, and have succeeded in preserving the children without hazard to the mothers. There is always something of doubt in these cases, whether the child might not have been preserved without the operation; but as such cases often come under consideration, and as I am disclosing all that my experience has taught me, it seemed necessary to mention this circumstance." Mr. Barlow thinks the " doubt" expressed in the above extract a sufficient ground for negativing the operation; but I cannot agree with him.

9. The question has been mooted, whether it would be right to induce premature labour on account of the presence of *certain dis-*

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* The patient was afterwards delivered naturally at the full time. The details of the case will be found in Dr. Collins's Practical Midwifery, p. 255.

eases caused by or connected with pregnancy. Denman remarks: "The propriety of this practice has also been considered when women have, during pregnancy, suffered more than common degrees of irritation, and especially when the stomach is in such a state that it cannot bear nourishment of any kind or in any quantity, and the patients are thereby reduced to a state of dangerous weakness. Presuming that these symptoms are purely in consequence of pregnancy, it may, perhaps, be justifiable to bring on premature labour."

Dr. Merriman relates a case occurring in the practice of a "provincial surgeon of considerable eminence." "The patient was teased with a very severe cough, and her stomach was so irritable as to retain no food whatsoever, nor even opium in a solid form. She had taken absorbents, stomachics, bitters, aromatics, and opiates, without experiencing any relief: liniments, fomentations, and blisters had been extensively applied without benefit, and she was thought to be sinking into her grave, when it was proposed, as a last resource, to bring on premature labour, six weeks before the full time, and the patient was delivered of a living child, and ultimately recovered." A case of fatal vomiting during pregnancy is related by Dr. Johnson in the Lancet, March 3rd, 1838, p. 825. "A lady, thirty years of age, soon after marriage ceased to menstruate, and became affected with morning sickness, which symptoms were naturally enough attributed to pregnancy. The sickness, however, gradually became worse, and at last nothing of any kind could be retained on the stomach. Pregnancy was not detected, but the disorder attributed to some disease of the pylorus. The sickness and extreme emaciation were the only symptoms present. After death no morbid appearances were observable in any part of the body. The uterus contained a fœtus about four months old. This patient was literally starved to death." "The treatment pursued consisted in the use of various salines, anti-emetics, counter-irritation, leeches, acetate of morphia sprinkled over a blistered surface," &c. Surely the induction of premature labour in this case would have been justifiable, as affording the mother a chance of recovery.

Other similar cases are on record, both of fatal vomiting, and of success by means of premature labour; and a case occurred to myself, in consultation with Dr. Maguire, of Castleknock. The patient was a young woman, pregnant of her third child, and at about four months was attacked with incessant vomiting, until her life was rendered intolerable, and her strength utterly exhausted. I never saw such agony in any case. We tried all the usual remedies, with occasional relief, but the vomiting returned, and finding that she could obtain no nourishment whatever, that her bodily powers were worn out, that her pulse was steadily 120, I determined, at the sixth month, to induce premature labour, which I effected by puncturing the membranes and giving ergot of rye. She was delivered of a dead fœtus, recovered rapidly, and has since borne a child at the full time.* In another case I followed the same practice, and with success so far that, after the fœtus was expelled, the vomiting entirely ceased, but she had been so much exhausted that an attack of diarrhœa carried her off.

It sometimes happens that the *serous effusion* which is usually confined to the lower extremities of pregnant females, is extended to the cavities of the pleura and peritoneum, and as it thus gives rise to a train of severe and perhaps dangerous symptoms, the induction of premature labour may be advisable in some cases, and has been practised by Siebold and Carus. Two such cases are related by Sinclair and Johnston.†

Puzos induced premature labour in a case of *strangulated hernia*, to facilitate the operation, and afford a better chance to the child. He saved the child, but the mother died afterwards.

On this part of the question I confess it appears to me almost impossible to lay down definite and general rules; the decision must rest with the judgment of the medical attendants in each individual case.

10. The only exception made by Baudelocque to his condemnation of artificial premature labour, is in those cases of great *uterine hæmorrhage* before the completion of the term of utero-gestation, when the child is probably destroyed, and the safety of the mother compromised.

These are all the circumstances which have ever been considered to justify our interference in the manner proposed.

Mode of operating.—Eight methods of exciting uterine contractions have been adopted and recommended by different practitioners.

1. Abdominal frictions and manipulation, with warm baths, &c., have been advised, but they very rarely succeed, their supposed advantage being the absence of unnecessary irritation.

2. Separating the membranes for two or three inches around the os uteri will frequently bring on labour, and as this is a close imitation of natural labour, it has been preferred by many. Dr.

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* Churchill on Diseases of Women, p. 616.

† Practical Midwifery, pp. 504, 508.

Hamilton remarks, "that he is now convinced, from the experience of the last ten years, that if there be a sufficient portion of the decidua separated from the cervix uteri, there is no occasion for the introduction of the open male catheter," *i.e.*, for puncturing the membranes. Dr. Conquest considers it as effectual as the other methods, and much safer for the infant, as saving it from pressure during the pains. If it fail, we can still have recourse to the third plan. Krause, and Merrem, and Valentin, advise the introduction of a flexible catheter into the uterus, outside the membranes, and allowing it to remain there till labour comes on. Professor Braun, of Vienna, has carried this separation a good deal further. He introduces a well-oiled catgut bougie high up into the uterus behind the membranes, and leaves it there. He says that it always excites pains in from six to twenty hours, and may be removed when the waters escape.* Dr. Inglis regards this separation of the membranes as the best method of inducing labour, whether by the finger or by "Hamilton's bolt."†

3. The membranes may be ruptured either directly or obliquely. For this purpose Wenzel, Ritgen, Klugè, Hopkins, and others, have invented appropriate instruments; but a catheter may be used, or a piece of wire, or a canula having concealed within it a spring trocar. Care must be taken to wound neither the mother nor child. This plan was adopted in Mampe's and Spoendli's cases, and, from its greater certainty, it has been preferred by most practitioners. Dr. F. H. Ramsbotham induced premature labour this way in thirty-six cases: sixteen children were born alive, and twenty dead, but two were delivered by craniotomy, and one by version. Dr. Moir, of Edinburgh, states that he had pierced the membranes obliquely at some distance from the os, when separation of the membranes had failed. He and his father had thus operated above twenty times.‡

4. MM. Brünninghausen and Klugè have proposed and practised, with great success, the dilatation of the os uteri by means of a piece of sponge placed within it, and maintained there by a plug in the vagina. Velpeau's experience of the value of these different plans is thus expressed :—"The two latter methods are chiefly practised. By the third, the effect is not always produced; it required three operations in the case related by M. Riecke. The separation of the membranes (the second method) is not sufficient to bring on uterine contractions; as the distension of the cervix is not permanent, the first attempt is rarely

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* Med. Times and Gazette, June 11, 1859, p. 606.

† Ed. Med. Journal, July, 1865.

‡ Ed. Monthly Journal, July, 1851.

successful. Distension, by means of a piece of sponge, as proposed by M. Klugè, is much more certain. The irritation which results is permanent, progressive, regular, and sustained by the plug which is maintained in the vagina. Under the influence of such an excitement, uterine action is soon brought on, and it rarely fails to acquire sufficient energy." It is advocated by Stoltz, P. Dubois, Chailly, and others; and Hayn, of Königsberg, to whose case I have referred, adopted this plan with success; but some authors do not agree with Velpeau in thinking it more certain than rupturing the membranes. Sir James Simpson has been in the habit of adopting this plan for many years without a single failure, and without irritation. He prefers beginning with a tolerably large tent, and introducing a larger one every six or eight hours. Labour generally comes on within a short period, and the first stage is shortened by the sponge. It has, also, the advantage of not rupturing the membranes. Sir James usually orders tepid water to be thrown up the vagina every hour for the purpose of enlarging the sponge.

5. Schweigbaüser seems to have been the first to suggest intra-uterine injections of water for the purpose of bringing on labour. Cohen of Hamburg, in 1846, proposed the injection of creosote water, and afterwards of plain water, by means of a tube or catheter introduced far up between the uterus and membranes, unless the placenta was reached. He then injected water until the abdomen was sensibly distended, or the fluid returned. This has been found very effectual, labour accruing on an average in seventy-four hours. Dr. Leopold Harting,* Dr. Stulz,† Mr. James and others have published successful cases thus treated. M. Kiwisch, of Prague, has proposed a simpler plan. He directs a continuous stream of warm water upon the os uteri by means of a long tube suspended from a height of about ten feet, and introduced into the vagina. The pressure pushes up the membranes, and probably separates them from the uterus, and the combination of this and the warmth rarely fail to bring on labour after eight or ten applications. It may be applied once or twice a day for ten minutes or a quarter of an hour. Dr. Arneth‡ mentions that it has been tried in six cases in the Vienna Lying-in Hospital, and that it succeeded perfectly in all but one. It has been used several times in the Dublin Lying-in Hospital, and succeeded perfectly. M. Paul Dubois has tried it successfully in two cases. In one, labour

* Monatschrift für Geburts., 1853, vol. i.

† Deutsche Klinik, 1834, Jan. 14, *et seq.*

‡ Die Geburtshülfliche Praxis, &c., zu Wien, p. 234.

came on after three applications, and in the other after eleven. Both were cases of contracted pelvis, and about the seventh month, and both women recovered well.[*] Dr. Tyler Smith has published a case in which he induced premature labour in four days by a stream of warm and cold water alternately;[†] and there is another, by Mr. Lacy,[‡] of distorted pelvis, in which the douche was successful after using it six times, three each day. Sir James Simpson's plan, of substituting Higginson's syringe, appears to me advantageous, as we can regulate the amount and force of the water, and the apparatus is less formidable. He informs me that he has tried it in several cases with great success. The stream of water should be kept up for five or ten minutes each time, care being taken to limit the escape of water from the vagina. Labour in one case came on the same day, in others it required four or five repetitions of the injection. Dr. Sinclair, of this city, has contrived a double syringe for this purpose, which the operator can work by each hand alternately, and so keep up a continued stream. Professor Scanzoni has been equally successful with carbonic acid,[§] and Sir James Simpson with ordinary air.

One or other of these methods will probably supersede the others, as avoiding all their inconveniences and possessing all their advantages. They preserve the membranes entire, and occasion neither local nor constitutional irritation, and seem peculiarly suited for cases of distorted pelvis, where it is difficult to reach the os uteri. But, on the other hand, they do not seem quite free from danger, especially aëriform injections. Some fatal cases have occurred, either, it is conjectured, from air passing into the uterine veins, or fluid into the peritoneal cavity through the fallopian tubes. Lassati[||] has published two fatal cases, and has collected thirty-six, of which twelve mothers died.

6. Dilatation of the os uteri by fluid pressure has been proposed and tried by Dr. Keiller, Mr. Murray, Drs. Storer and Barnes.[¶] For this purpose suitable caoutchouc bags are to be introduced within the os uteri, and filled with water by a syringe; increasing by degrees, if necessary, the size of the bag and the quantity of water. It has the double advantage of bringing on uterine action and preparing the os uteri for the passage

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[*] Moniteur des Hôpitaux, 10 and 12 Feb. 1853.

[†] Med. Times and Gazette.

[‡] Lancet, Dec. 4, 1852, p. 517.

N. Zeitschrift für Geburt., 1846, vol. xxi.

[§] Med. Times and Gazette, Oct. 11, 1856.

[||] Annali Univ. di Med. Milano, March, 1864.

[¶] Trans. of London Obstetrical Society, vol. iii. p. 107.

of the head. Dr. Hall Davis prefers the caoutchouc bag as a dilator.*

7. Ergot of rye is now generally believed to have the power of originating uterine contraction, and where it succeeds, it is a very effectual and safe mode of inducing premature labour, because we can preserve to the child the safeguard of the liquor amnii, which is of the greatest importance. Dr. F. H. Ramsbotham has published cases in which it was tried for this purpose. Labour was brought on by its use alone in fifty-five cases, without interfering with the membranes of the os uteri. All the mothers but one recovered; thirty-three of the children were born alive, and twenty-two still-born. Of the thirty-three born alive, five died soon after birth.† Dr. Paterson, of Glasgow, and Mr. Heane, of Gloucester, succeeded by this means. We have also seen that Dr. Hoffmann found forty-five cases in which it succeeded in bringing on premature labour. Although the medicine appears successful as regards the induction of labour and the consequences to the mother, yet the proportion of children lost is greater than by the other methods; and this must be a serious objection to its use when the pelvis will admit the passage of a viable child.

8. Prof. Scanzoni has tried, and in two cases successfully, to bring on premature labour by applying an india-rubber apparatus, like a sucking-pump, over the nipples for about two hours. In one, seven, and in the other, three applications were sufficient.‡ The chief objection seems to be the chance of irritating the breasts, and of failure in exciting uterine action.

9. In 1803, Herder proposed galvanism as an excitant of uterine action, and Drs. Horninger and Jacoby succeeded by it. In this country, Dr. Radford suggested it as a mode of inducing labour in 1844, and Sir James Simpson wrote in favour of it about the same time. The former practitioner has used it four times successfully to induce premature labour in cases of contracted pelvis; in a fifth case it failed. Dr. Barnes and others have also successfully employed it.

It has been suggested, that the application of the extract of belladonna might aid in the dilatation of the os uteri; but, independent of the fact being rather doubtful, the practice would be dangerous, in consequence of the active absorption and the development of the poisonous effects of the medicine.

An interval, varying from twenty-four to ninety-six hours, generally elapses after the operation, before uterine action commences, which it does sometimes by shivering and feverishness. "Great disturbance in the nervous system," says Dr. Gooch, "is produced by it; severe rigors, rapid pulse, and delirium are the occasional consequences; but these symptoms, proceeding from nervous irritation, do not continue long enough to produce any serious consequences." In many cases these symptoms are altogether absent. The patient will require the same management as after ordinary labour. It will be advisable to have a nurse in readiness, to supply the infant with its natural nourishment, until the mother shall have milk for it.

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* Parturition and its Difficulties, p. 88.

† Med. Times and Gazette, Jan. 7 and 14, 1854.

‡ Ibid., Oct. 1, 1853, p. 359.

CHAPTER X.

OBSTETRIC OPERATIONS. 2. VERSION, OR TURNING.

The term *version*, or *turning*, is applied by midwifery teachers generally to that manual operation by which one presentation is substituted for another less favourable; and, in a more limited sense, to the rectification of certain mal-positions.

For the furthering of one or other of these purposes, it has been known to the profession for a considerable period; but the full benefit of the operation, and the class of cases in which it is useful, are of much later discovery. It is recommended by Hippocrates, Celsus, P. Æginetus, Rhodion, &c.; by the early English authors, as Raynalde, Pechey, &c.; among the French by Ambrose Paré, Guillemeau, Portal, &c.

Statistics :—

Date.	Author.	Hospitals, &c.	Cases of Version.	Total No. of Cases.	References.
1781	Dr. Bland,	Westminster Dispensary,	9	1,897	Merriman's Synopsis.
	Dr. Jos. Clarke,	Dublin Lying-in Hospital,	48	10,387	Trans. of Assoc. vol. i.
	Dr. Merriman,	London, Private Practice,	14	2,947	Synopsis, 4th edit. p. 335.
1816	Dr. Granville,	Westminster Dispensary,	8	640	Report of, p. 25.
1826 to 1833	Dr. Collins,	Dublin Lying-in Hospital,	33	16,414	Pract. Treatise on Mid. p. 73.
1828	Dr. Cusack,	Wellesley Dispensary,	5	313	Dublin Hosp. Rep. vol. v. p. 495.

Date.	Author.	Hospitals, &c.	Cases of Version.	Total No. of Cases.	References.
1832	Dr. Maunsell,	Wellesley Dispensary,	2	442	Edin. Jour. No. 117.
1833	Do.	Do.	0	416	Dub. Jour. vol. v. p. 367.
1828	Mr. Gregory,	Coombe Hospital,	3	691	Dublin Hosp. Rep. vol. v.
1834 to 1837	Dr. T. Beatty,	Cumberland-strt. Hospital,	6	1,182	Dub. Jour. vol. viii. p. 66, vol. xii. p. 273.
	Dr. Reid,	... ...	28	5,691	Ranking, vol. iv.
1836 1837 1838	Dr. Churchill,	Western Lying-in Hospital,	11	1,640	See Reports.
	Mr. Mantell,	... ...	8	2,510	Amer. Med. Jour. vol. iv., p. 245.
	Dr. Adams,	... ...	9	628	Ranking, vol. iv.
1842 to 1845	Drs. M'Clintock and Hardy,	Dublin Lying-in Hospital,	23	6,634	Pract. Obs. p. 181.
1847 to 1854	Drs. Sinclair and Johnston,	Dublin Lying-in Hospital,	47	13,748	Pract. Med. p. 514.
1842 to 1864	Dr. Hall Davis,	Royal Maternity Charity,	60	13,783	On Diff. Labour, p. 339.
1859	Dr. Cross,	Private Practice,	46	4,733	Brit. Med. Jour.
Dec. 1799 to July 1811	Mad. Lachapelle,	Maison d'Accouch.	155	15,652	Pratique des Accouch. p. 198.
	Mad. Boivin,	Maternité,	218	20,517	Mémorial de l'Art, &c. p. 354.
1808	M. Ramboux,	Clin. de Liege,	1	216	Bull. de la Faculté &c. vol. ii. p. 73.
1825 1826	Dr. Merrem,	Cologne,	3	157	Do. vol. xvii. p. 283.
1828	M. Papavoine,	St. Louis, Paris,	1	240	Jour. du Progrès de Méd. vol. xiv.
1829	... ...	Hotel Dieu, Paris,	2	280	Velpeau, l'Art d'Acc. p. 50.
1830 1831	M. Ciniselli,	Clin. de Pavia,	2	94	Gaz. Méd. de Paris, 1835.
1833	M. Mazzoni,	... ...	18	481	Prospetto Ragionato, &c.
1834 to 1843	Dr. de Belli,	Milan,	51	2,739	Ranking, vol. iv.
1789 to 1792 and 1801 to 1806	M. Boer,	Vienna,	151	29,961	Die Natürliche Geburtshülfe, &c. vol. i. pp. 72, 148, 237; vol. iii. pp. 62, 130, 245.

Date.	Author.	Hospitals, &c.	Cases of Version.	Total No. of Cases.	References.
	M. Naegelè,	Heidelberg,	22	1,411	Velpeau's Tab. View.
1801 to 1807	G. M. Richter,	Moscow,	25	2,571	Synop. Prac. Med. Obstetric. p. 416.
	Do.	Private Practice,	27	624	
1812 and 1813	E. Von Siebold,	Wurzburg Hosp.,	6	310	Siebold's Jour. für die Geburtshülfe, &c. vol. i. pp. 114, 576.
frm. 1818 to 1829	Do.	Berlin Hospital,	60	2,055	Do. vols. iii. to x.
1819 1820	M. Ritgen,	Giessen,	1	180	Do. vol. vi. pp. 34, 262.
1814 to 1824	M. C. G. Carus,	Dresden,	29	2,133	Do. vol. vi.
	M. Kilian,	Clin. de Prague,	63	2,350	Bull. de la Faculté, &c. vol. xxv. p. 352.
	M. Klein,	... ...	216	35,417	Arneth, p. 135.
	M. Bartsch,	... ...	40	4,425	Ibid.
1824 to 1827	M. Klugè,	La Charité, Berlin,	19	1,254	Siebold's Journal, vols. vi. vii.
1825	Prof. Andrée,	Breslau,	5	181	Do. vol. vi. p. 154.
1825 to 1828	Dr. Brunatti,	Dantzic,	3	380	Do. vols. vii. ix.
1825 1826	Dr. Theys,	Trier,	1	49	Do. vols. vii. viii.
1826	Dr. Henne,	Konigsberg,	2	156	Do. vol. viii. p. 121.
1826	Dr. Voigtel,	Magdeburg,	1	29	Do. vol. viii. p. 831.
1827	Dr. Küstner,	Breslau,	6	176	Do. vol. ix. p. 92.
1829 to 1832	Dr. Adelmann,	Fulda,	1	166	Do. vols. xi. xiv.
1830 to 1832	Dr. Siebold,	Marburg,	8	321	Do. vols. xi. xii. xiii.
1833 1835 and 1836	Do.	Gottingen,	7	504	Do. vols. xv. xvi.
	Prof. Schwerer,	... ...	183	21,804	Ranking, vol. v.
	Dr. Arneth,	Vienna,	44	6,608	Die Geburtsh. Praxis, &c. p. 71.
1821 to 1842	Dr. Ricker,	Nassau,	2473	304150	Med. Times and Gaz., Oct. 11, 1851.
1858	Dr. Credè,	Leipzig,	61	1797	Brit. & For. Med.-Chir. Rev., July, 1860.
1858		Vienna Hospital,	39	8358	Ibid.

Thus we see that the records of English practice yield 82,696 cases, and 318 cases of version, or about 1 in $220\frac{1}{2}$; French practice, 40,376 cases, and 451 cases of version, or about 1 in $89\frac{1}{2}$; and German practice, 403,976 cases, and 3493 cases of version, or 1 in $115\frac{2}{3}$. The whole number of cases is 527,050, and of version 4262, or about 1 in $123\frac{2}{3}$.

It is not so easy to make out a satisfactory table showing the danger of the operation to the mother and child, from the want of details. Many writers do not mention whether any of the mothers died, and some omit the result as regards the child.

In the following table, I have taken all the numbers upon which I could depend, and though the list is not extensive, I believe that the average mortality will be found pretty correct.

Authors.	No. of Version Cases.	Mother lost.	Children lost.
Mad. Lachapelle	155	Not stated.	45
Mad. Boivin	218	Not stated.	48
Dr. Clarke	48	6	35
Dr. Collins	33	3	13
Dr. Cusack	5	0	2
Mr. Gregory	3	0	0
Dr. Beatty	6	1	6
Dr. Churchill	11	0	8
Drs. M'Clintock and Hardy	23	1	5
Dr. Hall Davis	60	3	40
Professor Andrée	5	0	3
Dr. Klugè	7	1	3
Dr. Küstner	6	0	2
Dr. Adelmann	1	0	0
Dr. Boer	26	0	10
Dr. Mazzoni	18	0	7
Dr. Arneth	44	3	14
Prof. Schwerer	183	14	93
Dr. Ricker	2473	176	1431
Dr. Meissner	351	4	104

Thus in 3350 cases, where the result to the mother is specially mentioned, 219 mothers died, or 1 in 15.

I do not give this result as the exact mortality of the *operation*, because it is evident that the deaths in many cases must have been owing to the *cause* which demanded the operation, as in placenta prævia; but as we find that even in several of these cases the fatal termination was evidently more owing to the operation than to the hæmorrhage, I am inclined to think the calculation not very far from the truth, if we include hospital cases as well as those from private practice. I have no doubt that if we could obtain sufficient numbers from private practice we should find the mortality to the mother, at all events, very much less. I have noted 20 cases in my own private or consultation practice, of which none proved fatal to the mother. However, any erroneous inference from these statistics will be guarded against by the recollection of the various and serious accidents which require the operation.

In 3753 cases, where the result to the child is detailed, 1616 children were lost, or 1 in 2½.

To a certain extent the same observations apply to this calculation of the mortality amongst the infants, and similar allowance must be made.

The *object* of the operation is threefold :—

1. To place the head in a more favourable relation to the pelvis, or to substitute the head for some other presentation.

2. To substitute the inferior extremities for some other less favourable presentation.

3. To hasten the termination of labour, in consequence of complications, as *convulsions*, *flooding*, *prolapse of the funis*, &c.

It has been proposed to turn and deliver instantly, in case of the sudden death of the mother, instead of having recourse to the Cæsarian section: but the mortality amongst children so delivered would preclude this application of the operation.

There is so much difference in the means by which the first and second objects are attained, that it is necessary to say a few words upon each.

1. *Version by the head*, or *cephalic version*, as it is termed, consists (*a*) in clearing the upper outlet of any part which may hinder the descent of the head; (*b*) in seizing the head, and bringing it down to the brim of the pelvis; or (*c*) in rectifying the mal-position of the head.

As the majority of children enter the world head foremost, this mode was decided to be the standard of natural presentation at a very early period, and attempts were made to correct any deviations. Rhodion, Raynalde, &c., endeavoured to change footling into head presentations, but not by internal manœuvre. After the discovery by Amb. Paré, Guillemeau, and others, of the ease with which labour could be terminated by bringing down the feet. cephalic version went very much out of fashion. By the great bulk of recent writers (especially in our own country) it is either not mentioned at all, or with reprobation. Still there are cases in which its suitability could not be overlooked, and in consequence we find an admission here and there of its utility. Smellie recommends it in certain malpositions of the head; Mauriceau advises it if the neck present; and De la Motte, Melli, and Roux speak of success obtained in this manner. Le Roi preferred it generally to version by the feet.

These, however, were only exceptions to the rule: it remained for Flamant, professor at Strasburg, to recall the attention of the profession to the operation, in such a way as to procure its readmission (at least on the Continent) into the number of valuable obstetric operations. His example has been followed by several German and French writers. Labbe, Eckhardt, and Wigand, published successful cases in 1803; Schnaubert in 1815; D'Outrepont and Regnaud in 1825. Busch gave an account, in 1826, of fifteen cases, in which fourteen infants were born living. In 1827 Ritgen collected forty-five successful cases. Riecke has had sixteen cases. It has been eulogised by MM. Vallée, De Roche, Ubersaal, Stoltz, and Toussaint. Jöerg and some others advise the head to be seized and placed in position when nearest the cervix, and Gardien seems inclined to recommend it strongly, "if practitioners were only as well versed in the use of the forceps as the professor of Strasburg."

One of the few British writers who speak well of it, is the late distinguished professor at Glasgow, Dr. Burns, who says, "For instance, if the patient be known usually to have a short labour, if the pains be brisk, the os uteri dilated, or in a relaxed and easily dilatable state, the liquor amnii retained, and the head movable, then the head may, without any difficulty or much irritation, be placed in the proper position, with a fair and reasonable chance of success." I may also cite the testimony of Dr. Dewees, who acknowledges that "should nothing but the position of the head, with a slightly diminished capacity in the antero-posterior diameter, affect the labour, we may sometimes enable the woman to deliver herself, provided the waters have discharged themselves, by the aid of two or three fingers within the vagina, and applied to the side of the head, so as to carry the vertex towards one of the acetabula;"—"when thus placed, we may commit the termination to the natural efforts, provided no other circumstance complicates the labour."

It is stated as an *objection* to the employment of this kind of manipulation, that it is more difficult to catch firm hold of the head and to bring it to the upper outlet; that if we succeed in bringing it to the brim we can do no more, but must then leave it to nature, or use the forceps. To these and similar objections, Velpeau has returned the following answer: "1st, It is not always very difficult to seize the head, and to exert considerable force upon it; 2ndly, if the waters have not been long discharged, one may often without difficulty seize the vertex, and bring it to the centre of the brim, however far it may have been distant; 3rdly, that in general it is better to force the head to descend, by pushing up the presenting part, than by bringing down the head; 4thly, that delivering by the breech is far from being a simple and safe operation; as regards the child, it is less so than cephalic version, even if the forceps should afterwards be applied."

No one can for a moment deny that there is considerable weight in the objections I have named; but a more detailed investigation will show that they are valid only against an indiscriminate employment of the operation, and not against its use in the cases to which it ought to be confined. These cases may be divided into two classes: 1, where the pelvis is of sufficient size, and nothing but the *mal-position* of the child's head calls for interference; 2, in certain *mal-presentations*, such as the neck or shoulder, and perhaps in a few arm cases, if the uterus be not strongly contracted, and especially if the waters have not escaped. It is evidently not calculated for any case where prompt delivery is necessary.

Its *advantages* are found to be,—first, a greater facility in reaching the head, for it is not proposed to be used in cases where the feet are near the os uteri; and secondly, a vast saving of infantile life. This operation will be no more fatal to the child than natural labour, if performed early, whereas in footling cases and in version by the feet, more than one in three are lost.

2. *Turning by the feet*, or *podalic version*.—This was known to the ancients, but confined by most of them to the case of dead children. To Ambrose Paré we are indebted for demonstrating its facility and comparative safety, and for inculcating it in practice. His distinguished pupil, Guillemeau, followed in his footsteps, to be himself succeeded by others of brilliant talent and profound research, who cleared up the difficulties, and settled the limits, and laid down the rules for the operation.

The peculiar *advantages* of version by the feet are:—

1. That it gives to the operator the entire control over the whole process of the labour, so that he can regulate its duration, either acting with, or independent of, the pains.

2. That though inferior in its results to labour with head presentation, it is about equal to any other, and superior to some.

3. That in some cases it is the only chance of saving the child's life, or of avoiding evisceration.

4. That in certain cases it affords a probability of saving the mother's life, when other means are hopeless.

On the other hand, its *disadvantages* are not to be overlooked; for—

1. From the distance the hand has to traverse, and the difficulty of seizing the feet and of turning the child in utero, there must ever be a fearful risk of injury to the mother.

2. The mortality amongst the infants thus brought into the world is very great; as far as our statistics extend, they yield 1616 out of 3753 delivered, or 1 in $2\frac{1}{2}$.

From all that I have said, it will not be difficult to specify the *cases to which the operation is applicable.*

1. It may be used in all cases of *mal-presentation,* whether of the superior extremities or trunk.

2. If, upon the introduction of the hand for cephalic version, it be found impossible to rectify the *mal-position* of the head, we are advised to seek for the feet, and bring them down.

3. In all cases of *placenta prævia,* many cases of *ruptured uterus, convulsions, prolapsed funis,* &c., the operation is available, and has been used with great success.

4. Sir James Simpson has revived the recommendation of Exton, Pugh, Ould, and Burton, to substitute turning, in certain cases of distortion of the pelvis, for craniotomy, on the grounds that the base of the skull being narrower than the inter-parietal diameter, and the head more compressible under tractile than expulsive efforts, the child might be delivered, and perhaps saved by a less severe operation. And further, that as turning might be attempted at an earlier period than is usual for craniotomy in such cases, we might thereby afford the mother greater security of a favourable result to herself. And he has supported his views by statistics taken from Dr. Collins's work, but without sufficient care and caution, as it appears to me.

Now let us examine into the practical application of his proposal. The bi-mastoid diameter in the six cases of measurement he gives, varied from $2\frac{6}{8}$ in. to $3\frac{2}{8}$ in.; and a living child can pass through a pelvis of $3\frac{1}{4}$ in. antero-posterior diameter with or without the forceps. With a pelvis of this size the operation is then unnecessary, and if the antero-posterior diameter of the pelvis be less than 2$\frac{6}{8}$ in. the operation would be impracticable. Then these are the limits of the operation: for us to attempt to drag a child through a smaller space would be unjustifiable. For the success of the operation, then, we must *be able to ascertain* that the pelvis is within these limits, and perhaps in some few cases, with whose former labours we are accurately acquainted, we may do this, but in an immense majority of cases it will be, I think, impossible; and it happens, as Dr. Collins has shown, that the greater number of cases of difficult labour he met with were first cases, in which, of course, no such precise judgment could be attained. It is only fair, however, to state that, by putting the patient under the influence of chloroform, and introducing the hand into the vagina, Sir James Simpson has an opportunity of estimating the diameter of the brim more accurately than by any of the ordinary modes of measurement.

Again, the life of the child is not secured and its chance but little increased, even if our estimate of the pelvic diameters be accurate; for if in turning with an ordinary-sized pelvis, more than one-third of the children are lost, the mortality will be surely much increased if its diameter be reduced more than one-fourth.

Moreover, if we should miscalculate the size of the pelvis, or if the head should be a trifle larger than usual, so far from the safety of the mother being increased, it would be very seriously diminished; for we must then craniotomize the child after incurring the hazard of turning, and in a most unfavourable position.

Lastly, even if we succeed in selecting a suitable case and in extracting the child, it has yet to be proved that the mother would not incur considerable danger from contusion or laceration in forcibly dragging the child through a narrow pelvis; for I must remind my readers that we have no statistics of the proposed operation to compare with those of the old method, the few cases adduced by Sir James Simpson being of no value for this purpose.

I must therefore object to the *general* adoption of Sir James Simpson's plan, for the reasons above stated: the difficulty of ascertaining the exact diameters of the pelvis, the very little benefit to the child, the great risk to the mother of doubling the operation. At the same time I do not mean to deny that there are some cases in which it may be worth trying, as every successful case is a rescue of a life from destruction. So far as it is applicable, it is one mode of limiting the operation of craniotomy, an object we must all have at heart. In these conclusions I am very glad to adduce the concurrence of Dr. Radford, whose papers are no doubt familiar to my readers in the pages of the Provincial Medical and Surgical Journal. I may also refer to the very interesting paper of Dr. M'Clintock.*

The next point for our investigation is the *period most suitable* for making the attempt; so as not to interfere rashly on the one hand, nor to delay too long on the other, "*neque temerè nec timidè*——" Of the two errors, it is hardly too much to say, that excessive delay is the more serious.

1. If the case be one requiring *cephalic* version for the rectification of a *mal-position*, it is clear that the operation can only be safely, if at all, performed before the uterine efforts have wedged the head into the upper strait; the attempt should be made so soon as it is evident that the natural powers will not rectify the mal-position. It will be an additional motive for *prompt* assistance, if we find the pains violent, and that the patient have had many children, lest the head, not being able to enter the brim, should be turned aside, and forced through the uterine or vaginal parietes.

2. (*a*) If we are called to an *arm presentation*, or any demanding *podalic* version, before the escape of the liquor amnii, and we find the *os uteri* hard and undilatable, it will be advisable to wait until some change takes place before we introduce the hand; neither is there any risk worth mentioning, provided we remain with the patient, to operate instantly when the waters break.

(*b*) If we see the patient before the rupture of the membranes, and find the os uteri soft and dilated or dilatable, there is no reason for deferring the attempt, if the case require this kind of interference, and great advantage in operating while the uterus is distended. If we act as soon as the os uteri will admit the hand, it is the better time, because we then turn the child as if in a bag of water; and this gives us so clear an advantage that it needs no explanation.

(*c*) If the os uteri be dilatable, the sooner the attempt is made after the escape of the waters the better. Gardien says that the most favourable moment is just when the waters break.

(*d*) After the escape of the waters, we sometimes find the os uteri neither rigid nor much dilated, and the pains moderate. In such cases, no time should be lost; the hand should be introduced into the vagina, and gentle, yet firm and persevering, efforts made to pass it into the uterus. Dr. Blundell says, "In ordinary cases, if the mouth of the womb be as broad as a crown-piece, and if the softer parts be relaxed thoroughly, the introduction of the hand is not exposed to greater risks than usual; there seem to be no circumstances preclusive of the operation, and the sooner you commence the better."

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* Trans. of London Obst. Soc., vol. iv. p. 175.

(*e*) So far, although these cases are each more serious than the other, yet in none of them has any very great difficulty, either of decision or of execution, been experienced. We are, however, often called to a class of cases where our utmost judgment, patience, and skill will be needed. I refer to those cases of arm presentation, where, in the language of Foster, "the membranes have been a long time ruptured, the waters totally evacuated, and the womb closely contracted around the fœtus, which is then thrust considerably into the pelvis, the parts of the woman being dry, hot, tender, and often in a state of inflammation and tumefaction, especially when unskilful endeavours have been used to extract or turn the fœtus, or to dilate the parts."

In such a case, to force the hand through the os uteri would be to rupture that organ, and cause the death of the woman. It is admitted by all authors, I believe, that the operation must be postponed for a time, and means tried to soften the uterus and suspend its contractions. For this purpose all are agreed in the propriety of taking sixteen or eighteen ounces of blood from the arm, and following up this with a large dose (gtt. lxxx. to gtt. c.) of laudanum. Dr. Collins has proposed another remedy of great value. He says, "In such a situation, where the individual is strong and plethoric, twelve or fourteen ounces of blood should be taken from the arm, and a table-spoonful of the following mixture given every half-hour, which I have found exceedingly useful, both in quieting uterine action, and inducing relaxation :—

℞ Aquæ fontis, ℥vj.
Antim. tartar. gr. iv.
Aceti opii, gtt. xxx. M."

By these means, after the lapse of a short time, we shall find the uterus relax, and the os uteri soften, so that with a little patience, gentleness, and time, we may attain our object. In many cases, as I have found, the full exhibition of chloroform will render the introduction of the hand under such circumstances much more easy, as it surely renders the operation painless.

3. When the case is one of *placenta prævia* or even of *accidental hæmorrhage* (if it demand delivery), it is a general rule to operate as soon as possible. The os uteri seldom offers any resist-

ance, when the loss of blood has been great; and as this loss is necessarily increased by the natural efforts in unavoidable flooding, it is evident that the earlier we deliver, the better for the patient.

If we decide upon trying this operation in *convulsions, prolapsed funis*, or *ruptured uterus*, it will be wise to attempt it as soon as the state of the os uteri will permit.

Method of operating.—This operation is usually divided into three stages: the introduction, the turning, and the extraction. I shall shortly describe these, in each kind of version.

1. *Cephalic Version.*—The rectum and bladder having been previously emptied, the patient is to be placed in the posture most convenient to the operator; some recommend that she should lie on her back, others that she should kneel, or lie on her left side, as in ordinary labour. The latter position is generally adopted in this country. Whichever hand we choose to operate with is to be well oiled or soaped, and then insinuated through the os externum edgeways. Mr. Roberton recommends that the vagina should be filled with lard previously, and that the left hand should be used.* As most men are right-handed, I think the greater facility in using that hand will counterbalance any supposed inconveniences. Great gentleness will be necessary, and, contrary to the advice of some, it would seem better to do this during an interval of pain. When the greater part of the hand is in the vagina, it will be necessary to change its direction from that of the axis of the lower outlet to that of the upper outlet. This will avoid all injury to the vagina, and will bring the points of the fingers to about the situation of the os uteri. Through the os uteri (and membranes if entire), the hand is to be insinuated very gradually, in a conical form, and during the interval of the pains; holding still, but not losing ground, when the pain comes on. When the hand is in the womb, if our object be to rectify the position of the head, it should be seized, and placed in one of the oblique diameters of the brim, with the posterior fontanelle corresponding to one of the acetabula—*i.e.*, in the first or second position. If our object be to change the presentation—for example, to substitute the head for a shoulder—we must gently push up the shoulder, and then seizing the head, bring it down to the brim, and place it in the most favourable relation to the pelvis; and it might facilitate the operation if the patient were placed on her hands and knees.

Having now done all that we can by the hand alone, it may be withdrawn, and the further progress of the labour left to the efforts of nature; should these be found inadequate, recourse must be had to the forceps.

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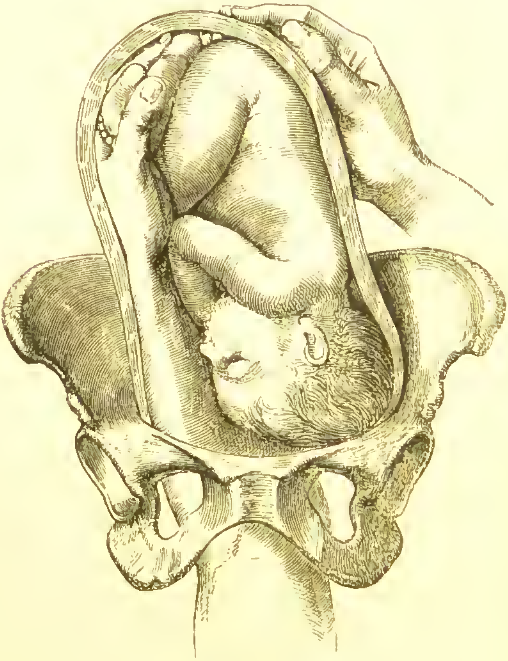
* Phys. and Dis. of Women, and Midwifery, p. 328.

This is the ordinary method of placing the head in position for descending; but Wigand has stated that it is possible, before the waters have escaped, to change the position of the head, or even the presentation, by external abdominal manipulations. Velpeau confirms this from his own experience, and something similar is stated by Sennert and Martins. Riecke has also related several such cases, and Meissner four quite recently. Dr. Burns, in a note to his ninth edition, states that, "Mr. Buchanan, of Hull, informs me that he succeeded in one instance lately, 'where the left side of the breast of the fœtus lay diagonally over the pelvis, with the head forward,' in bringing the head right, by making the patient kneel and raise the breech, whilst the shoulders were brought as low as possible. The water had not been discharged. The situation of the head, when it came down, was made more favourable by the finger. The child was alive."

A very interesting memoir has been published by Professor Martin, of Jena, on turning by external manipulation alone, founded on thirty-four cases, seven of which occurred to himself. The conditions which render the operation eligible are—1. The non-necessity for immediate delivery; 2. Mobility of the child, which generally ceases after the discharge of the waters; 3. Absence of great sensibility of the womb or abdomen; 4. Sufficient capacity of pelvis, but a moderate contraction is no counter-indication; 5. A normal activity of pains; 6. The child being alive is a subordinate condition. The mode of operating is as follows:—As long as the os is undilated and the pains irregular, the patient is kept upon the side upon which the part desired to be forced into the pelvis is placed. When the os is dilated, and the waters are expected to escape, the bladder and rectum having been emptied, she is laid on her back, the lower part of the body being somewhat raised. With one hand (warm), continuous and moderate pressure, downwards, is made on that part of the fœtus which lies nearest the os, whilst the rest of the body is pressed upwards. This simultaneous pressure is begun during the interval of a pain, and continued during its commencement, while during the height of this the uterus is firmly supported on every side. After a short pause the manipulation is again commenced; and if the operator's hands become tired, an assistant may support the belly on each side while he rests. If the pains are long absent the patient may be placed on her side, the projecting part being supported by a band or cushion, and this position should be maintained when the head has entered the pelvis. When the manipulations have succeeded, and the head or breech is within the os uteri, the membranes should be ruptured, to secure from further change. The pressure may be sometimes diffused, sometimes special, by the points of the fingers; and it should always be double and simultaneous: downwards of the part we wish to engage in the pelvis, and upwards towards the fundus of the rest; and for this purpose an accurate recognition of the parts of the child is indispensable.* It appears that this operation has the support of MM. Stolz, Ritgen, and Esterle's authority, and Dr. Spingler has recorded a case in which he succeeded.†

Fig. 71.



(*From Moreau.*)

Dr. Braxton Hicks proposes to aid the external manipulation by one finger in the os uteri acting in the reverse direction to the hand externally. He relates 8 cases in which it was successfully employed in placenta prævia; 1 of accidental hæmorrhage; 3 of convulsions; 2 of prolapse of funis; 4 of arm presentation; 2 of back presentation; and 1 of shoulder presentation.* I quite agree with Dr. Braxton Hicks in the advantages to be derived from this method, and that it ought always to be tried; but in many of the cases to which we are called, I fear it would be impossible from labour having set in, and the uterus in active contraction.

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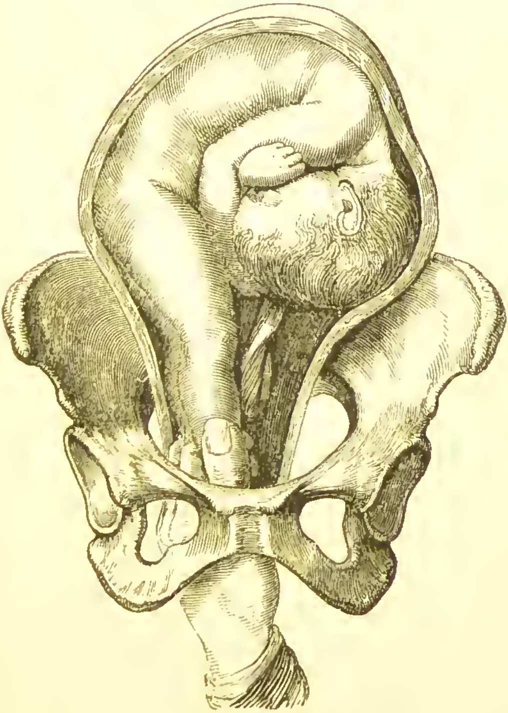
* Ranking's Abstract, vol. xii. p. 278, from Froriep's Notizen.
† Ibid., vol. x. p. 329.

2. *Podalic Version.*—I shall not repeat what I have said as to the mode of introducing the hand through the os externum and os uteri. The hand and arm of the infant will be our guide; for it is better not to attempt to put it back, much less to separate

Fig. 72.



(*From Moreau.*)

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* Obstetric Trans., vol. iv. p. 219.

it, "after the manner of the ancients." Denman remarks, "In no case is it necessary, or in anywise serviceable, to separate the arm of the child previous to the introduction of the hand of the operator. In some cases to which I have been called, in which the arm had been separated at the shoulder, I have found greater inconvenience, there being much difficulty in distinguishing between the lacerated skin of the child and the parts appertaining to the mother. The presenting arm is never an impediment of any consequence in the operation, and therefore, in my opinion, ought not to be regarded, or on any account removed."

Arrived at this point, an examination should be made as to the position of the child's body. Having ascertained all about it, the hand is to be passed over the *front* (chest and belly) of the child, as it is in front that we meet with the feet. It is often a matter of difficulty to reach them, as well from the distance to be traversed as from the contraction of the uterus. This part of the operation should be slowly and gently performed, resting occasionally, and keeping the hand quite still and flat upon the body of the child during a pain, so as to avoid both injury to the mother and great pain to ourselves from the violence of the uterine contractions.

Having found one or both inferior extremities, before we begin to extract we must examine the limbs we hold, and be assured that we have not mistaken a hand for a foot. The feet being held firmly in the hand, must then be brought with a waving motion slowly into the pelvis. While we are withdrawing the hand, the waters of the amnion flow away, and the uterus being somewhat emptied by the evacuation of these, and the extraction of the inferior extremities, we must wait till it contracts, and on the accession of a pain the feet must be brought lower, till they are at length cleared through the os externum.

The *turning* of the child is accomplished *during an interval* of pain, the feet being brought over the front of the child, and not over the back, which would risk dislocation of the spine; and as the feet are drawn down, the head will ascend.

The *extraction* of the child is to be accomplished gradually *during a pain*, and in drawing downwards we should be careful not to place the fœtus in a wrong position as to the pelvis. Some advise us to leave the labour to nature, after turning the child, but to this Dewees rightly objects. He says, "The whole act of turning should be considered as one of necessity rather than of choice; therefore, where it is proper to commence with it, it is, we believe, always proper to finish with it, and not trust the delivery to the powers of nature, after having brought the feet into the vagina, as recommended by some." The case is after this to be managed precisely as a footling case.

Throughout the operation I have spoken of bringing down *the feet;* it is now right that I should mention some modifications of this plan.

Peu, Burton, and Wm. Hunter recommended that the hips should be seized and brought to the brim of the pelvis. The latter, in his MS. lectures, says, speaking of arm presentations: "In this case you are to introduce the hand into the uterus, and gently put up the arm, and turn the child to a breech presentation. Reduce it if possible to a *perfect breech case,* that it may come more gradually, on account of the head and the navel-string, lest you strangle the child. If, however, you find this impracticable, let it come footling, but sustain the child at the hips as long as you can, they being, next the head, the largest and most unyielding part." In Germany this plan has been advocated by Schweighæuser, Schmidt, and Betschler; it is, however, seldom or never tried. The breech would be more difficult to seize and bring down than the head, and we should (as in cephalic version) lose all control over it, after placing it in position.

Again, it has been strongly advised to hook down the knees instead of seizing the feet, by Burton, Delpech, and Breen. In this recommendation, Dr. Burns seems to coincide. I shall quote Dr. Breen's own statement of its advantages. "By this proceeding (hooking the finger in the flexure of the knee) the child would be made to revolve on the lesser axis of the trunk, and the foot would be brought into the vagina within the reach of a noose. By adopting a different procedure, and endeavouring to lay hold of a foot according to the usual directions, it is obvious that the hand of the operator must traverse a greater space of the uterus—a matter of very considerable difficulty, either when the action of that viscus is strong, or when it is closely contracted on the body of the child. This difficulty being surmounted, when the foot is laid hold of, it is very apt to slip, and recede from the grasp, as well from the violence of uterine action, as from the hand being cramped and nearly powerless by reason of the previous exertion. By adhering to the direction of hooking the knee, the hand of the operator is in a great measure protected during the pains, and he is enabled deliberately to proportion the force requisite to change the position, to the resistance he encounters. Besides, as the knees must have been nearly in contact with the superior part of the abdomen, from the earliest development of the extremities of the embryo, should what may be called accidental circumstances have removed them from this natural and usual position, but little force will be requisite to restore them to it."* Of course, should a foot be nearer the os uteri than a knee, Dr. Breen would advise its being seized.

These reasons certainly appear of sufficient weight to justify the admission of Dr. Breen's suggestions, as an improvement upon the previous mode of turning.

Lastly. As it is not always easy to seize both feet, we are told by many writers not to be solicitous about the second, but to extract by one alone. The reason given is simply to avoid pain to the mother, and to save the difficulty and trouble of seeking for a second. A similar recommendation has been given by Dr. Radford, of Manchester; but for very different, and, as far as my experience goes, for very valid reasons:—"The results of practice," he says, "prove what may be inferred by reasoning, that the *child's life is much more frequently preserved in those cases in which it presents the breech, than where the feet come down first.*" "Is there, then, no practice which would enable us to bring down a part, approximating in its measurements to those of the breech presentation, which we have already stated to be so safe to the child, but which cannot be affected in turning operations? There is,—and this practice consists in NEVER *bringing down more than* ONE FOOT in the manual operation of turning a child."

The following measurements were obtained from children born at the full period of utero-gestation:—

The circumference of that portion of the head which presents in labour, is from . . .	12 to 13¼ inches.
Do. of the breech, with the thighs flexed upon the abdomen, as in breech presentations, from	12 to 13½ ,,
Do. of the breech, *with one thigh turned upwards towards the abdomen, the other extended*, from	11 to 12½ ,,
Do. of the hips, the legs extended as in feet presentations, from	10 to 11½ ,,

It is evident from these measurements, that it will be safer for the child to bring down only one foot, for inasmuch as the breech with the thigh turned up is more bulky than the hip with the legs extended, by so much will the passage be better prepared to admit the quick transit of the child's head, upon which the safety of the infant depends.

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* Edinburgh Med. and Surg. Journal, vol. xiv. p. 29.

Sir James Simpson recommends seizing one knee, and that the opposite to the upper extremity which presents, *i.e.*, if the right arm present, the left knee is to be brought down.

From what has been stated, it will appear that the *difficulties* of the operation are almost entirely owing to the uterus being in action. When it is quiescent, or nearly so, the operation is easy; but when the contractions are violent, it is often tedious, difficult, and very painful, both for the patient and operator. These contractions equally impede the introduction of the hand, the finding of the feet, and the turning of the child. Once so much is accomplished, they become of valuable assistance in completing the delivery.

The *danger* to the mother may arise—1. From the operator not changing the direction of his hand, in accordance with the pelvic axes, and consequently pushing his fingers through the vagina.

2. The hand may be forced through the walls of the uterus, if too much force be used in searching for the feet.

3. The uterus may bruise itself against the hand, or the limbs of the fœtus, during the turning.

4. Rupture of the cervix uteri may occur, either during the introduction of the hand or the extraction of the child, especially if the operation be hurried or too much force be used.

5. Without any evident injury, the irritation of the operation may give rise to subsequent inflammation.

6. The nervous shock may be serious, or even fatal.

The simple enumeration of these dangers ought, one would think, to go far towards obviating most of them.

The danger to the child consists—1. *In compression of the funis*, which commences about the time the buttocks appear at the os externum. After this time, if there be much delay, the child will perish from the interrupted circulation, unless by chance the funis should have lodged in the angle at the junction of the os sacrum with the os ilium. To obviate this danger, it was proposed by Pugh to introduce a pipe into the child's mouth, and excite respiration, while the head was yet in the vagina. Bigelow and Baudelocque are said to have employed this in practice.

2. If much extracting force be used, the spine may be dislocated; the hips also; and the leg has been pulled off.

3. Compression of the head is enumerated by Dewees as one of the dangers to which the fœtus is exposed.

It only remains for me now to say a word as to the *after treatment.* The patient will probably need an anodyne after the operation, and it is good practice to join a few grains of calomel with the opium or Dover's powder; or a mixture containing sixty drops of laudanum, two drachms of sal volatile in six ounces of camphor mixture, may be ordered, of which a table-spoonful may be taken every two or three hours. It will be necessary to exercise great watchfulness to detect the first inroads of inflammatory action, which must be met by antiphlogistics, according to the strength of the patient, and the violence of the attack.

Careful inquiry should be made as to the character of the lochial discharge each day, and if necessary the vagina be syringed with warm water.

The most absolute quiet and rest are desirable. If the infant be alive, the mother should not be teased with it for some hours.

CHAPTER XI.

OBSTETRIC OPERATIONS. 3. THE VECTIS, OR LEVER.

So many claims have been put forth to the invention of this simple instrument, that it is not very easy to trace it to its author. It has been ascribed to Celsus, to Mauriceau, to Schitling, and to Palfyn; but the credit, so far as I can judge, belongs to Henry Roonhuysen, from whom it is extremely probable that Dr. Chamberlen obtained a knowledge of the invention. To others it was also communicated, but "for a consideration;" and the matter was kept secret until, in 1753, two Dutch practitioners, MM. Jacobus de Visscher and Hugo van der Poll, whose names deserve most honourable mention, and more especially as they did not practise midwifery, conceived the project of making public a discovery which promised such valuable results. They bought the secret for a large sum of money (Baudelocque says 5000 livres de France) of Gertrude de Bruyn, daughter of Jean de Bruyn, and wife of Hermann van der Heiden, and immediately published an account of it in the Dutch language, thus terminating the secret history of the vectis.

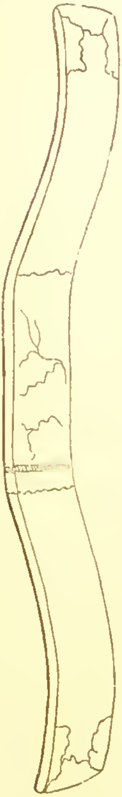
I have not been able to ascertain that the Chamberlens imparted a knowledge of the vectis to any practitioner in this country, although at the time of the publication of Visscher and Van der Poll the forceps was ordinarily used in London. Since then it has obtained more or less notice in works on midwifery, though it has been to a great extent superseded in practice by the forceps.

In France, Mauriceau invented an instrument something like the vectis, for the purpose of extracting the head when separated from the body. In 1715, Isaac de Bruas, and in 1738, M. Rigaudeaux, constructed each a vectis, to meet the difficulty of certain cases to which they were called. In 1753, Warroquier, of Lisle, used one blade of Smellie's forceps as a lever. After the publication of Visscher and Van der Poll, the instrument occupied the attention of the profession, who were much divided in opinion as to its merits. At present it is but slightly esteemed.

As it was amongst the Dutch the vectis originated, so do they appear to have estimated it most highly, and cultivated it most successfully. In addition to the names of Henry and Robert Roonhuysen, I may mention those of Ruysch, Boekelmann, De Bruyn, Plattmann, Boom, Rooy, De Moor, Visscher, and Van der Poll; of Titsing, Palfyn, Berkmann, Van de Haar, Stylcke, Jaus, De Bree, De Bruas, Van Geuns, Rathlauw, &c. Van Swieten, in his Commentaries upon the Aphorisms of Boerhaave, published in 1754, refers to the discovery of this instrument as a benefit conferred on the human race. He remarks: "Quamvis autem egregii viri, qui varios forcipes invenerunt, aut perfecerunt, omnem laudem mereantur, et ob industriam et ob candorem, quo sua inventa publicò communicaverunt, tamen videtur *vectis* ille *Roonhuysianus* reliquis esse præferendus." The celebrated Camper published a paper in 1774, in which he advocated the use of the lever, and spoke highly of its advantages. In 1794, Johannes Mulder published a very learned and valuable history of the forceps and vectis.

The Vectis of Roonhuysen is thus described by M. Preville, from the memoir of Visscher and Van der Poll: "L'instrument de Roonhuisen est un morceau long et quarré de fer bien forgé, de $10\frac{3}{4}$ pouces de long et large d'un pouce: son épaisseur sans être garni est de $\frac{1}{8}$ d'un pouce, et étant garni, de $\frac{3}{8}$ d'un pouce. Ce fer est droit au milieu de la longueur de 4 pouces, et se courbe insensiblement vers les extrémités. Ces courbures sont à peu près semblables, et étant mesurées dans leur concavités elles ont 3 pouces $\frac{1}{4}$ de courbure et environ $\frac{3}{8}$ de pouce de fond. Ce levier de fer doit être soigneusement arrondi de tous côtés, et principalement aux quatre coins, afin qu'il ne puisse pas faire du mal lorsqu'on l'appuie. C'est pourquoi les extrémités des courbures, quoique bien arrondies, doivent être garnies d'un emplâtre de diapalme étendu sur du gros linge de la longueur d'un pouce en dedans ; le morceau droit du milieu situé entre les deux courbures, et par lequel se fait la plus forte pression contre les os pubis, doit être tout à fait garni de cet emplâtre, et un peu plus fort au milieu. Il faut surtout avoir attention que ces emplâtres soient appliqués fort également sur le fer, sans le moindre pli. Après avoir garni le fer de ces emplâtres, on le garnit tout entier de peau de chien mince et fort douce, et il faut observer que cette peau doit être appliquée fort unie, et que les coutures de la peau soient au dehors, c'est à dire, du côté convexe de l'intrument." It is added, " Nous avons trouvé une petite corde entortillée autour d'un des bouts de l'instrument, dans l'endroit où la courbure est plus grande, comme on le voit même dans la figure ; ce que nous croyons ne servir à autre chose, si non pour marquer qu'on doit se servir de ce côté plutôt que l'autre, ou pour mesurer l'approche de l'instrument."

Fig. 73.



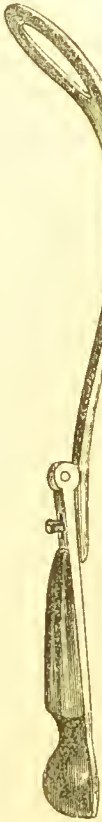
(*Roonhuysen.*)

Many changes have been made in the form of the instrument and in the materials of which it is formed. Titsing padded it with wool ; Morand and Herbiniaux made it of ivory ; others of wood, bone, or silver. " When the vectis was first known in this country," says Dr. Denman, " that described by Heister was preferred to those recommended by the surgeons of Amsterdam. The vectis used by Dr. Cole was like one blade of the forceps, somewhat lengthened and enlarged. That of Dr. Griffith was of the same kind, with a hinge between the handle and the blade ; and that of Dr. Wathen was not unlike Palfyn's, but with a flat handle and a hook at the extremity of the handle, which prevented its slipping through the hand, and might be occasionally used as a crotchet. Many other changes have been made in the construction of the instrument, but the vectis now generally used is of the following dimensions : The whole length of the instrument before it is curved is $12\frac{1}{2}$ inches. The length of the blade before it is curved is $7\frac{1}{2}$ inches. The length of the blade when curved is $6\frac{1}{2}$ inches. The widest part of the blade is $1\frac{3}{4}$ inch. The weight of the vectis is $6\frac{1}{2}$ ounces. The handle is fixed in wood."

The one in ordinary use is that described by Dr. Lowder, and improved by Mr. Gaitskell, who says, "The vectis should be thirteen inches in length, one half to form the handle, the other the curve. The handle should be made of hard wood, rendered rough for the purpose of obtaining a firmer hold, and made to screw on and off. When the instrument is made with a hinge handle, it is very difficult to introduce; therefore this construction of the instrument should never be adopted."

Mr. Ogden has given the description of an instrument which he calls the "tractor-vectis," and which is to be used solely as an extractor. It does not differ very much from the lever in the plate, except that the curve is sharper, and the fenestrum so shaped as to secure a firm hold on the chin or occiput. The oblong diameter of the fenestrum is $1\frac{7}{8}$ths of an inch, and the transverse $1\frac{1}{8}$th of an inch. The rim encircling this is of uniform thickness, and $\frac{3}{8}$ths of an inch wide. It is introduced posteriorly, and its position changed to the right or left, as may be desirable.*

Fig. 74.



The *nature of the aid* afforded by the vectis is threefold:—

1. To correct mal-positions, or aid the natural rotations of the head at the brim, or in the cavity of the pelvis; and to this the majority of French practitioners limit its employment.

2. *As a lever* of the first or second kind, *i.e.*, making a fulcrum of the pelvis, or of the left hand of the operator external to the pelvis. Its employment in the first way is extremely hazardous, from the certainty of crushing the soft structures lining the pelvis, and the probability of injuring the urethra or the child's head. Many authorities who employ and recommend the lever, would altogether reject it, and I think justly, rather than so use it. This objection does not hold against the second mode, which is the proper one, if it be employed as a lever at all. The discoverers and first possessors of the secret made the arch

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* Obstetric Record, Feb. 1, 1849.

of the pubis the fulcrum. In order to avoid the urethra, Boom, Boekelmann, and Titsing rested it upon the ramus of the ischium.

3. *As a tractor.*—Dr. Burns says, "It is unfortunately named, for it ought not to be employed to wrench, but to hook or draw down the head; and its proper application would be less apt to be mistaken were it called the tractor." This can only be done with the curved vectis; with the one used by Roonhuysen no tractile power could be exerted. When the force thus employed is sufficient, it is by far the safest application of the instrument, but I confess that I have not been successful in my trials with it.

The *cases suitable* for the employment of the vectis appear to be the following:

1. Before the head has fully entered the upper outlet, when, either from slight mal-position, or from very slight narrowing, the uterine efforts are ineffectual in advancing the labour. Froriep advises it in cases of face presentation, and after version, when the head is difficult to extract.

2. It was recommended by its early patrons in cases where the head has become impacted in the pelvis: in fact, it was considered as superseding in a great measure the use of the crotchet. After the description I have given, I need hardly say that it is not merely powerless in such cases, but very likely to be injurious. Levret, and some other French writers, have admitted its employment in some cases where the head was rather tight in the passage —to use their own words—on the point of being "*enclavée*," but not when impacted.

I have hitherto deferred stating the two principal conditions of its employment, even in these cases, viz., *the presence of labour pains*, without which there could not be a chance of success; and *the dilatation of the os uteri.*

3. The case which appears to be most suitable for the use of this instrument, and in which the probability of success is greatest, is that in which the head, having descended into the pelvic cavity, is arrested in its progress, not by any mechanical impediment, but by the inefficiency (not absence) of labour pains, and when the patient is beginning to show symptoms of constitutional or local disturbance. This condition does not take place until the second stage of labour has lasted some time, and as, after these symptoms have shown themselves, there is danger to the patient in further delay, it is important to obtain aid. "In this most favourable presentation," says Dr. Breen, "the uterine action is occasionally for hours exerted in vain, from causes which we are frequently unable to account for. Much delay may excite fears for the safety of the child, and lay the foundation of a tendency

to inflammation in some of the soft structures of the mother, indicated by some one, or several of the following symptoms: increased frequency or fulness of the pulse; tongue loaded in its centre; secretion of urine diminished, and becoming higher in colour, sometimes requiring to be drawn off by the catheter; countenance assuming an anxious aspect; stomach irritable; general increase of restlessness."

Now as there is supposed to be space enough, and pains, though feeble, a slight additional force will often succeed in bringing the infant into the world at once. As there is nothing in the nature of the operation to add to the danger, and especially as the tractile force will probably be sufficient, it seems peculiarly suitable to this case; and I may add, that all the testimony I can collect is in favour of its application.

4. In cases of convulsions, or other accidents occurring during parturition, provided only that the pains continue, the assistance of the lever may be sufficient to terminate the labour.

As to the *time* when the instrument may be most advantageously used, I may adopt the words of Mr. Dease:—"It requires a certain degree of cool discernment, which I believe is only acquired by long practice, to know when a woman is still capable of assisting her labour, or when the head is sufficiently low in the pelvis to use the extractor." If the object desired be to aid the head in passing through the upper outlet, or to rectify its position there, it will be well to operate so soon as the os uteri is dilated or dilatable.

When the head is in the pelvis, it is desirable to have it as low down as may be, as the operation is then much easier. "Under these circumstances," says Mr. Dease, "I think it best to examine the woman as she lies on her side: if the surgeon finds that the head is sunk deep in the pelvis towards the sacrum, at least one half, he may apply the extractor: he should not form his judgment of the descent of the head from examining towards the pubis; for here, from the shallowness of the pelvis, and the swelling of the scalp, he will be very apt to be deceived, and imagine the head to be much lower down than it really is."

In coming to a conclusion on this point, however, regard must be had to the constitutional symptoms; if these be urgent, it would be unwise to lose time after the period at which the vectis may be easily applied.

The occurrence of any of the accidental complications will in each case determine the period for operating, according to the urgency of the symptoms.

I regret much not having any *statistical results* to submit, but in this, as in too many other cases, practitioners seem to have concluded, that as the instrument is said to be quite safe, it was therefore useless to record the facts.

De Bruyn is said to have used it successfully 800 times in forty-two years. MM. Titsing and Berkmann used it 262 times in twenty-four years, and saved 80 or 90 children in the 100.

Dr. Copeman has published twenty-four cases occurring in his private practice.* All the mothers recovered well, and twenty-four children were saved. Dr. R. U. West used it in twenty-two cases. The mothers recovered, and two children died.

As to the *comparative results:* the *alternative* of the vectis is the forceps, and their respective merits have been the subject of controversy with most writers who have treated of them. Upon reading over the different sides of the question, it would seem that each writer has taken up the subject too much as a partisan. To compare their utility in certain cases is little more than a waste of words: as, for example, where the pains have ceased, or where compression is required to extricate the head of the child. In such cases the vectis is of no use, and it would be highly reprehensible to employ it. But where there is room, and when the pains persist, there the vectis, being sufficiently powerful, has this signal advantage, that there is but the one blade to be introduced, and but the thickness of that one blade added to the child's head. It is possible that the single blade may be able to act where the bulk of two would render extraction impossible. These appear to me to be the peculiar advantages of the vectis, and therefore I shall not detail the controversy more fully, but refer to the works of Osborn, Bland, Denman, Camper, Herbiniaux, Levret, Burns, Conquest, &c. &c.

One point, however, I must notice, which has been urged in favour of the vectis—viz., the secresy with which it may be used. Now this I consider a decided disadvantage. I most fully agree with the opinion of Dr. Osborn, and shall make no apology for transcribing it at length, as it applies forcibly to all midwifery operations:—"In the first place I am persuaded, that if concealment in the use of the means intended for relief in laborious or difficult labours be not permitted, but that the absolute necessity of such means be first established, and that every practitioner be obliged openly and avowedly to use them, we should never again hear or read of one person having used the vectis in 800 and another in 1200 cases (Van Swieten, Camper, and Herbiniaux). Nor shall we again hear of the great number of women which some practitioners are constantly boasting of having delivered;

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* Records of Obstetric Consultation Practice, &c., p. 63, *et seq.*

for no man can attend a great number of women in labour, in the manner he ought, in the way nature demands, or a conscientious discharge of his duty requires. Nor do real difficulties occur so often as to render it possible to believe that any man's life could afford such numbers of difficult cases as are stated in the printed accounts from abroad. As I feel thoroughly convinced of the propriety and necessity of a fair and candid avowal of the use of instruments, in every case of midwifery where they are to be employed, so I must insist that their concealment cannot be justified by any proper motive. Such an open avowal implies a conviction in the practitioner's mind of that irresistible necessity for their use that supersedes every other consideration: it implies a consciousness of the rectitude of his conduct, and it implies a voluntary acceptance of the consequences of the operation, which ought to make part of his professional duty: and it clearly demonstrates to the satisfaction of the patient and her friends, that no motive of convenience to himself could urge him to an operation which may prove ruinous to his own reputation and interest. Besides, not to insist upon that responsibility from the operator, is to deprive the patient of the best and surest security against a precipitate performance of the operation. If once the practitioner can rest assured that, let the event of the case be ever so unsuccessful, the injurious effects of his operation will be buried in eternal oblivion, by blending the mischief arising from the indiscreet use of instruments with the natural consequences of labour, he will certainly have nothing to weigh against the tempting advantages of convenience or emolument to himself; but while he is shortening the duration of the most irksome part of his professional duty, the waiting upon a slow and lingering labour, he will flatter himself that, by delivering, he is doing an acceptable service to his patient, in shortening the duration of her sufferings."*

METHOD OF OPERATING.—Premising then that the case is one adapted for the vectis, that there is space enough, that the os uteri is fully dilatable, if not dilated, that there are pains, and that the patient and her friends have been made acquainted with our intention, it next remains for us to consider the method of using the instrument:—

1stly. As a lever; and,

2ndly. As a tractor.

1. *As a lever.*—The first point to be decided is, over what part the instrument is to be applied; and here we have latitude enough.

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* Essays on Midwifery, p. 141.

"Some," says Dr. Gooch, "apply it over the occiput; others behind the ear, by which it has a bearing against the prominence of the mastoid process, and others against the chin. The two first are perhaps the best when the head is high, as considerable force is required to move it, which may be employed with more safety against either the occiput or mastoid process than against the chin. But when the head is low down, resting on the perineum, less force will be necessary, and the vectis may then be applied against the chin: but the instrument requires to be used with great caution, lest the jaw should be injured." De Bruyn applied it over the mastoid process; Camper over the lower jaw; Lowder on the forehead, &c. &c.

I have already pointed out the temptation to make the soft parts of the mother the fulcrum, and the mischiefs which result. As far as my judgment extends, it would seem that the vectis ought never to be used as a lever of the first class; even as one of the second class, much caution will be necessary. "When an instrument of this sort is used, it is proper to make the hand the fulcrum on which it acts: now if the force required is but small, this may certainly do well enough, but where great force is required, this is a very bad support; besides, the bony parts of the pelvis lie so convenient, that we may rest our instrument on any part of it. Yet we should recollect, that whatever part we convert into a fulcrum, we injure more or less, according to circumstances. If we apply it over the symphysis pubis, we press upon the urethra; or if in other situations, we shall injure the clitoris or vagina."*

"The injuries inflicted, indeed," Dr. Ramsbotham observes, "must have been frequent and great—and this led Peu, in 1772, to suggest the possibility of delivering by the vectis, without making a fulcrum of the mother's structures. He proposed a practice, which is now sometimes adopted, of grasping the shank of the instrument with the left hand—the outer edge of the little finger being applied towards the vulva—making that hand the fulcrum, and pressing the extremity of the blade on the child's head, by raising the handle firmly on the right."†

Having determined on what part of the infant the lever is to be applied, the instrument is to be well warmed, greased, or soaped, and the patient placed in the usual position for delivery, on her left side; the operator is to introduce one or two fingers of his left hand to serve as a director for the vectis, which is to be carefully and gently passed over the convexity of the child's head, until it has reached the point to which the force is to be applied.

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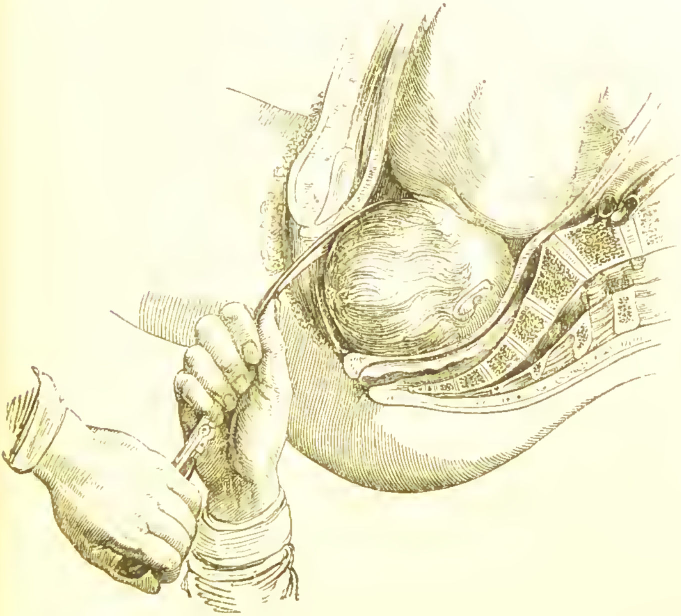
* London Practice of Midwifery, p. 208.

† Lectures in Medical Gazette, May 31, 1834, p. 307. See also Baudelocque, vol. ii. p. 47.

Fig. 75.



This attained, the handle should now be held firmly with the right hand, while the index and middle finger of the left, fixed about two inches from the screw part, within the vagina, become a fulcrum. On this fulcrum, or point of support, the instrument is made to move from the sacro-iliac symphysis towards the hollow of the ilium, by the action of the right hand on the handle. In this way it describes the section of a circle, and glides on to the occiput. Should the occiput point to the right ilium, the left hand must be employed; if to the left ilium, the right hand must be used. When a pain takes place, the accoucheur should gently aid it by drawing down in the axis of the pelvis. In this way the occiput is depressed, while the chin approaches the child's breast, and the head is reduced to the smallest compass, and is thus enabled to pass through the cavity of the pelvis. As soon as the occiput is brought so low as to press on the perineum, the instrument should be withdrawn, and re-introduced with the usual precautions. The object now in view is to place the instrument over the face of the child. To effect this, the hand must be passed up, as at first directed, to the right or left sacro-iliac symphysis, according to the situation of the face. When the instrument gets above the brim of the pelvis, a finger or two must be inserted by the side of the instrument, and pressed on till it passes over the forehead on to the face, so as to embrace the chin. The practitioner has now nothing to do but to draw down during the pain, increasing the power according to the degree of resistance.*

Or if we prefer it, the right hand, grasping the handle, may be made the fulcrum, and the force applied by the left hand at the junction of the blade and handle, directing it downwards and backwards until the descent of the head is accomplished. If the instrument should slip, a fresh purchase must be obtained. As the head passes over the perineum, the efforts may be relaxed; and if the pains appear sufficient, it may be withdrawn altogether, and the termination left to nature.

2. *As a tractor.*—The preliminary steps, introduction, &c., are the same as when it is used as a lever; but instead of making use of one hand as a fulcrum, both hands are employed in the one office of maintaining a firm purchase, and drawing downwards and a little backwards during the pains. The effort is to be relaxed during an interval; and this alternation of traction and rest is to be continued until the head has descended to the inferior outlet. As before, it may be allowed to pass over the perineum without assistance, if the pains be adequate to its expulsion.

There is, I believe, no *danger* to the mother or child when the vectis is in skilful hands, but in those of the ignorant or inexperienced great mischief may be done.

1. It may be introduced before the os uteri is dilatable; of this error, contusion, laceration, and death may be the consequences.

2. By an incautious mode of passing the instrument, the parietes of the uterus may be ruptured.

3. By employing the extracting power, without bearing in mind the different axes of the pelvis, and the position of the fœtal head in relation to those axes, the lever will be inefficient, and the mother injured.

4. By passing the instrument outside the uterus instead of within its cavity, a fatal wound may be inflicted.

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* Gaitskell, London Medical Repository, November, 1823, p. 380.

5. By exerting the power without regard to the pains, the operation will be in vain.

6. By making a fulcrum of the soft parts of the mother, much injury may result.

7. By exerting too much force as the head passes over the perineum, or neglecting to support it, you may tear the perineum, so as to lay the genital fissure open to the anus.

8. By making too much pressure with the point of the instrument upon the part of the child to which it is applied, a wound may be inflicted.

The subsequent *treatment* varies very little from that required after ordinary labour: there is very little shock, and no injury, if the operation be skilfully performed. The parts should, however, be carefully examined, and, if necessary, a spirit lotion applied. The same treatment should be applied to the head of the child, if the instrument have bruised the integuments.

CHAPTER XII.

OBSTETRIC OPERATIONS. 4. THE FORCEPS.

It will be at once admitted, I believe, that the greatest triumph of surgery is to diminish the frequency of operations, and to substitute those of minor severity and danger for others involving more serious risk. If this be true, then it must be granted that the invention of the forceps, and their employment in practice, is one of the greatest improvements recorded in the annals of operative midwifery. Before the introduction of this instrument, the only extracting force at command was obtained by the insertion of a hook into the head of the child; such as is now used in the operation of craniotomy.

This proceeding must of course have been fatal to the child in an immense majority of cases, and the very few who were born alive must have been subsequently endangered by the mutilating process employed in the delivery. But this was not all; every man possessing common feelings of humanity must have shrunk from the painful necessity of such a proceeding, and have deferred the operation as long as possible, by which the danger to the mother was greatly increased. Now, from this double risk and fearful mortality we have been relieved by the invention of the forceps; for although we are still obliged to destroy the child occasionally, to secure the safety of the mother, yet this class of cases is incomparably smaller than that in which, by the timely application of the forceps, both the child and mother escape injury.

For these reasons, I conceive that I am justified in stating that the invention and employment of this instrument is one of the greatest improvements that has ever taken place in midwifery, even though I may not go the length of certain of its advocates, in asserting that it is entirely without danger to the mother or her infant.

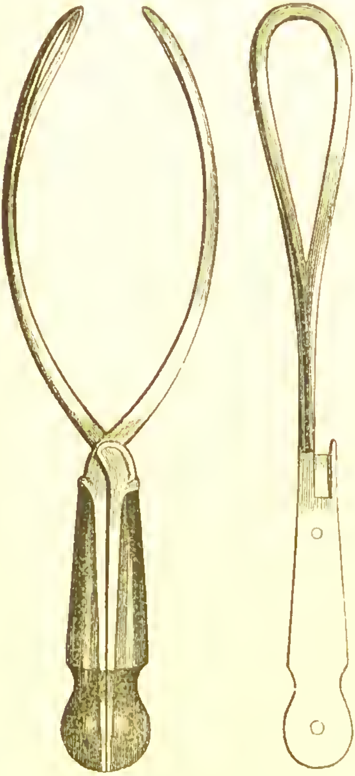
It cannot be said that the ancients were altogether ignorant of this method of extracting the infant, although it does not appear to have been generally known. Mulder, in his valuable work, gives the following extract from a translation from the works of Avicenna: "Oportet ut inveniat obstetrix possibilitatem hujusmodi fœtus, quare subtilietur in extractione ejus paulatim; tunc si valet illud in eo, bene est; et si non liget eum cum margine panni et trahat cum subtilitur valde cum quibusdam attractionibus. Quod si illud non confert administrentur forcipes, et attrahatur cum eis; si vero non confert illud extrahatur cum incisione, secundum quod facile fit, et regatur regimine fœtus mortui." This very distinct allusion to the forceps seems to have made no impression, for we find no similar attempt to extract the child until the middle of the sixteenth century; at which time (1554) Rueff recommended an instrument resembling a pair of lithotomy forceps, for the purpose of extracting dead children, or of supplying a deficiency of manual force. It does not appear, however, that he appreciated the value of the forceps as subsequently employed, nor did his contemporaries carry out his suggestion, for it was not until a century later that the instrument was brought into practice. Before the time of the Chamberlens, it was unknown in England, and even at the time that Dr. Hugh Chamberlen published his translation of Mauriceau, in 1672, it was still a secret. No allusion to such an instrument is to be found in Raynalde's work (1634), nor in the translations of Portal (1705), Deventer (1716), or La Motte (1745).

In his preface to the translation of Mauriceau (1672), to which I have referred, Dr. Hugh Chamberlen, after mentioning the method of extracting the child by hooks, observed, "But I can neither approve of that practice, nor of those delays, beyond twenty-four hours, because my father, brother, and myself (though none else in Europe, as I know) have, by God's blessing, and our industry, attained to, and long practised a way to deliver women in this case without any prejudice to them or their infants; though all others (being obliged, for want of such an expedient, to use the common way) do and must endanger, if not destroy, one or both, with hooks. By this manual operation, a labour may be despatched (in the least difficulty) with fewer pains and sooner, to the great advantage and without danger, both of woman and child; if, therefore, the use of hooks by physicians and chirurgeons be condemned (without thereto necessitated through some monstrous birth), we can much less approve of a midwife using them, as some here in England boast they do, which rash presumption in France would call them in question for their lives."

This extract, however, does not fix the date of the invention by Dr. Chamberlen, nor have we any very accurate data for doing so. Paul Chamberlen, surgeon, seems to have been the father of three sons—Dr. Peter (born 1601), Paul and Hugh. From Dr. Monk it appears that the latter was born in 1664, so that he cannot be the translator of Mauriceau (1672), but may possibly have been his son. I have a portrait of Paul Chamberlen, dated 1658, and it is that of a man at least aged fifty. That the forceps was known to more than one of these persons, is clear; but which of the Chamberlens was the actual inventor does not appear capable of proof.

From some vagueness of expression in the extract I have quoted from Dr. Hugh Chamberlen's preface, it was even doubted whether the instrument alluded to was the forceps, but that doubt has been set at rest by Mr. Cansardine, who has published an account of the discovery of Chamberlen's own instruments. "The estate of Woodham Mortimer Hall, near Maldon, in Essex, was purchased by Dr. Peter Chamberlen, some time previous to 1683, and continued in his family till about 1715, when it was sold by Hope Chamberlen to William Alexander, wine-merchant, &c." In an old chest, found in one of the chambers of this house, certain obstetric instruments were discovered, along with "old coins, trinkets, gloves, fans, spectacles," &c., and were presented to Mr. Cansardine, who thus describes them: "First, we have a simple vectis, with an open fenestrum; then we have the idea of uniting two of these instruments by a joint, which makes each blade seem as a fulcrum to the other, instead of making a fulcrum of the soft parts of the mother; and which also unites a power of drawing the head forward. This idea is at first by a pivot, which being riveted, makes the instrument totally incapable of application. Then he goes to work again, and having made a notch in each vectis for the joint, he fixes a pivot in *one only*, which projecting, is to be received into a corresponding hole in the other blade, after they have been applied *separately*. It may be observed, that although there is a worm to the projecting part of the pivot, yet there is no corresponding female screw in the hole which is to receive it. Every practical accoucheur will know that it is not easy, or always possible, to lock the joint of the forceps with such accuracy as to bring this pivot and hole into opposite contact. This Chamberlen soon discovered, and *next* produced a more light and manageable instrument, which instead of uniting by a pivot, he passes a *tape* through the two holes, and winds it round the joint, which method combines sufficient accuracy of contact, security, and mobility."*

Fig. 76.



Short Forceps.

There can now be no doubt of the credit of the invention being due to Dr. Paul Chamberlen, and I have proved that it took place before the year 1647. The secret was, however, carefully preserved, nor had it been communicated in the year 1716, for in Dr. Hugh Chamberlen's third edition of Mauriceau, published in that year, the passage I have quoted is continued in the preface.

About this time, or soon after, the secret appears to have been communicated to one or two, for Dr. R. W. Johnson, when speaking of the forceps, says: "Besides these, I have a pair of forceps, which did belong to the late Mr. Drinkwater (late Surgeon and Man-midwife at Brentford), who began practice in 1668, and died in 1728. The size and form of this pair agree with those of Chapman and Giffard, save only that the hooks of the handle are turned outwards."

And Mr. Chapman, in 1733, published a description and a plate of the instrument, which he had used from the year 1726, stating it to be the instrument used by the Chamberlens, but

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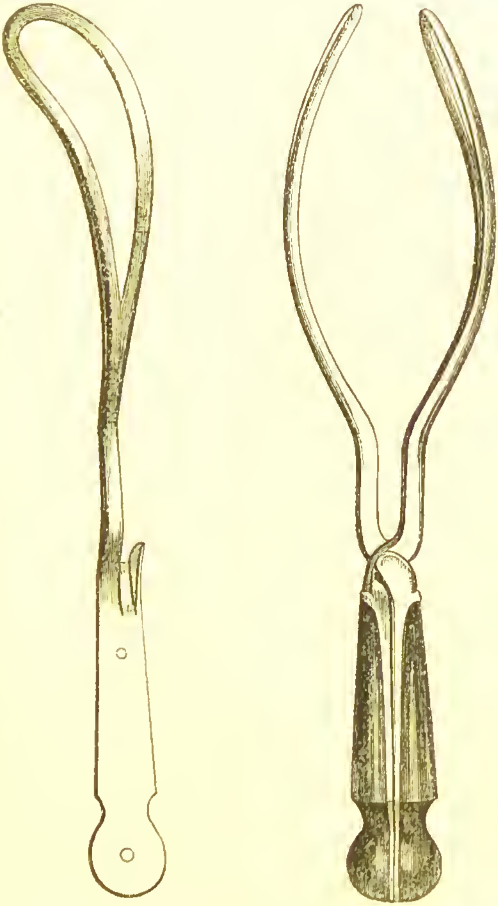
* Mr. Cansardine's paper in Med.-Chir. Trans., vol. ix. p. 183.

Fig. 77.



Long Forceps. (*Dr. Ramsbotham.*)

without stating whence he procured it. I have not succeeded in discovering from whom he received it, though from his not claiming the merit of the invention, it is evident that it was communicated to him. He has, however, the great credit of being the first in these countries who published an account of it for the benefit of the profession.

After this period, the forceps is described and recommended for various cases by almost all British writers.

The credit of first introducing this instrument into French practice is due to Palfyn or Gilles le Doux of Ypres. One of the first persons who used it was M. Duse, whose example was followed by Mesnard, Gregoire, Levret, Coutonly, &c.

The earliest German practitioner who made use of the forceps appears to have been Cornelius Van Solingen in 1673; he was followed by Slevogt, Velsen, Schlichting, &c.

The original instrument has been variously modified according to the fancy of different practitioners.

The chief peculiarities may be pointed out in a few words.

1. The most striking variation observable is in the length of the instrument—some being sixteen or eighteen inches long (fig. 77), and others only eleven (fig. 76). The object of the greater length is evidently to enable us to act before the head has descended into the pelvis. The shorter forceps can only be used when the head is in the cavity. The longer instrument possesses greater lever power, and requires greater skill and care in its management.

2. There is a considerable difference in the distance between the blades of different forceps when closed—some being nearly wide enough to admit an ordinary-sized head, whilst others approximate very closely. These instruments must necessarily possess a very different degree of power; with the latter, the head may be powerfully grasped and compressed, and a great extracting force exerted, whereas the former can do little more than extract with moderate force, when the resistance is not great. The latter are the more useful in skilful hands, but the former are perhaps safer for ordinary use.

3. To some of the instruments a second curve is added, the convexity of which is intended to correspond to the hollow of the sacrum, and the concavity to the symphysis pubis, in order that the instrument may be applied in the axis of the cavity and upper outlet. The second curve ("curvatura nova," as Mulder calls it) has been added both to the long and short forceps. I do not believe that it is advantageous in either kind; in the latter it is often very inconvenient. It is far better to have both these instruments perfectly straight, the diversity of curves recommended by different writers answering no useful purpose.

4. The fenestrum varies in length and breadth in different forceps; in some it is altogether absent, and in others it is very

wide. The object of the latter modification is to avoid as much as possible adding to the bulk of the child's head, and to diminish the risk of injury to mother and child. I doubt whether the object be attained by this arrangement, and when the forceps are introduced antero-posteriorly, the additional breadth of the blade which is underneath the arch of the pubis may prove very mischievous to the sides of the outlet.

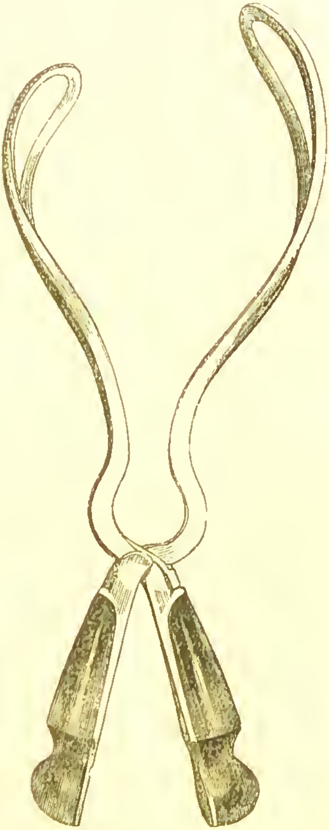
5. In other forceps the breadth of the blade is continued to the handle, for the purpose of containing an opening, through which the other blade (which is slightly narrower) is passed, so as to insure their apposition.

6. Certain contrivances have been added to the handles of the instrument, to prevent their being pressed too closely together; and in some forceps the blades do not cross, in order to avoid compressing the child's head.

7. The blades have been wrapped with leather, to prevent injury to the scalp of the child. This plan is now very properly abandoned, as it could not be of any use, and rather added to the difficulty of introduction. The blades have also been covered with gutta percha; and Dr. Shekleton informs me that it facilitates the introduction, and he thinks it in several ways an improvement.

8. Mr. Radford has altered the long forceps, and, as he states, with great advantage. The blade, which is to be applied over the occiput, is much shorter than the other, so that when it touches the neck, the other (owing to the oblique position in which the head descends) will embrace a great extent of the an-

Fig. 78.

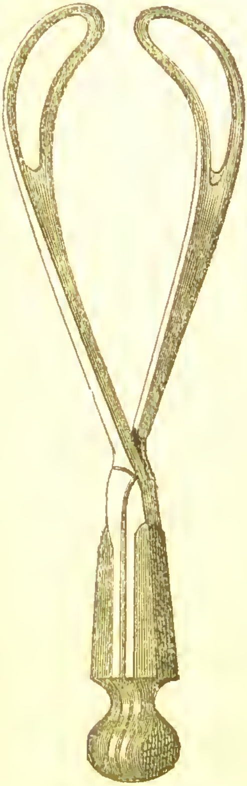


Radford's Forceps.

terior part of the head. He has also lessened the compressing power of the instrument, by placing the joint nearer the outer end of the forceps.

9. Dr. Davis, of University College, London, has shown much ingenuity in varying the forceps, so as to meet the different circumstances in which they are required.

Fig. 79.



10. Dr. Bond has proposed an arrangement of the joint of the forceps, by which they are permitted a rocking motion upon each other without diminishing the power of the instrument. The handles are Siebold's, and the blades Dr. Davis's, but the lock is Dr. Bond's invention.* I cannot speak of the value of the invention, but I do not admire the form of the blades.

In London, a modification of Levret's forceps is used for the higher operation, and Smellie's for the cavity of the pelvis. In Edinburgh, both the long and short forceps are employed, with the single or double curve. In Dublin, the long forceps is rarely used, and the short one resembles Smellie's, without the second curvature. In France, Levret's forceps, or a modification of it, is in general use. In Germany, the forceps of Boer, Levret, Schmidt, Stark, Siebold, Brünninghausen, Naegelè, Osiander, &c.; and in Italy, the forceps of Levret or Assalini are employed.

Since the first edition of this work, I have taken some pains to modify the shape and proportions of the short forceps, and from the testimony of many practitioners, I think I may say that I have succeeded in improving the instrument, although the alterations are but slight (fig. 79). I still prefer the single curved forceps. The length should be 12 inches, of which the handles occupy 4. The interval between the points of the blades when closed should be 1 inch, and at the widest part of the curve

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* American Journal of Med. Science, July, 1850, p. 70.

3 inches. The breadth of each blade at the widest part should be 1 inch, the fenestrum $2\frac{1}{2}$ or 3 inches long, having the lower part of the blade solid steel, to give greater firmness. The curve of the instrument should not commence for fully $3\frac{1}{2}$ inches above the handle, and will consequently be much increased towards the point. Lastly, the edges of the blades and fenestra must be nicely bevelled off. The advantages I have found from these changes are an increase of tractile power, without the necessity of grasping the handles so tightly, and compressing the head; the exact fitting of the head into the hollow formed by the curves, so as to avoid distending the perineum by a part of the instrument not actually of use, and the prevention of springing and slipping by the solidity of the lower part of the blades.

The hand that is to. use the instrument is, however, of more importance than the instrument itself, of which it may be observed with truth, that "that which is best administered is best."

The *object of the operation* with the forceps is either,

1. To facilitate delivery, when its progress is arrested by certain mal-positions of the head, at the brim, or in the cavity of the pelvis.

2. To supply the want of uterine action, or to render it effective for the expulsion of the child.

3. To save the mother from the evil consequences of a labour too prolonged, and from the necessity of a severer operation.

4. To save the life of the child, or at least afford it a chance of escape from certain destruction.

That these objects are attainable will, I trust, appear from the *nature of the aid* afforded by the forceps, and that they have been in many instances attained, the *statistics of the operation* will prove. It was not for some time after the invention of the instrument that its powers, and the limitations of those powers, were understood. The story of Chamberlen's Paris adventure is a good illustration. He visited Paris, and offered to deliver any patient the faculty chose, with his instrument: they gave him a case of distorted pelvis; he tried, and of course failed, and left the city in disgrace. Had he carefully studied the cases to which the instrument was applicable, he would have been spared the annoyance.

It is evident that the forceps possesses a twofold power—

1. That of grasping and compressing the head of the child.

2. That of acting as a lever of the first kind, and as an extractor.

The compression exercised by it *must* be limited within the degree the head can bear without injury, and *may* be limited by the form of the instrument. The extracting force will be in proportion to the firmness of the grasp, and limited by the resistance, and the danger of injury to the mother. Now it is ascertained, that if there be space sufficient, such a grasp may be obtained of the child's head, without injury to it, as will enable us to extract it, and that the extracting force thus exercised is not sufficient to injure the mother: thus the forceps may supply the want of uterine pains.

Many cases occur in which the transverse diameter of the child's head is slightly greater than the antero-posterior diameter of the brim, or the transverse diameter of the lower outlet; but where a slight additional compression would enable it to pass: now, if this do not exceed the amount of compression which the head will safely bear, and if the force required for extraction be not sufficient to injure the mother, such compression and extracting power may be afforded by the forceps, which will thus render the uterine action effective. No doubt it requires great tact and long experience to decide upon the probability of success, but we have high authority for the propriety of the attempt in such cases. To those who lack experience, the failure of a very cautious effort will be a sufficient evidence of its impracticability, and with ordinary care no mischief will be done.

Lastly, in most cases where the head is not impacted, a sufficient grasp may almost always be obtained, either at the upper outlet or in the cavity, to enable us to change the position of the child.

STATISTICS.—I trust I have made it appear, from the nature of the aid afforded, that the first and second objects of the operation are attainable; how far this is the case with the third and fourth must be shown by statistics. But before I give the results of the operation to the mother and child, it may be well to ascertain the average frequency of its occurrence. For these purposes, I have searched all the records within my reach, and the result is the following Tables:—

FREQUENCY OF THE OPERATION.

a. *Among British Practitioners.*

Date.	Authors.	Total No. of Cases.	No. of Forceps Cases.	References.
1781	Dr. Bland . . .	1,897	12	Merriman.
1787 to 1793	Dr. Jos. Clarke . .	10,387	14	Trans. of Assoc. vol. i.
	Dr. Merriman . .	2,947	21	Synopsis.
1818	Dr. Granville . .	640	5	Report of West. Disp.
1825 to 1833	Ed. Lying-in Hosp.	2,452	15	Reports.
1828	Dr. S. Cusack . .	398	1	Dub. Hosp. Rep. vol. 5.
1829	Do. . . .	303	3	Do.
1826 to 1833	Dr. Collins . . .	16,414	24	Prac. Treat. on Midwif.
1834 to 1837	Dr. Beatty . . .	1,182	9	Dub. Jour. vols. 8, 12.
	Mr. Lever . . .	4,666	9	Guy's Hosp. Reports.
1838	Mr. Warrington .	88	1	Amer. Med. Journal.
1840	Do. . . .	110	3	Do.
	Mr. Mantell . . .	2,410	6	Do.
1836 to 1840	Dr. Churchill . .	1,640	3	Researches, &c.
1849	Drs. M'Clintock & Hardy . . .	6,634	18	Pract. Obs. p. 95.
1820 to 1827	Dr. Ramsbotham .	68,435	112	Obst. Med. p. 720.
1842 to 1844	Dr. Murphy . . .	467	4	Rept. of Univ. Col. Hos.
	Dr. Storer . . .	451	8	Amer. Jour. Oct. 1851.
	Dr. Reid	5,691	31	Ranking, vol. 4.
	Mr. Earle . . .	4,320	32	Prov. Jour. June, 1846.
	Dr. Toogood . .	1,135	15	Do. vol. 8, p. 103.
	Dr. Adams . . .	628	14	Ranking, vol. 4.
	Dr. Pagan . . .	8,684	82	Glasg. Jour., July, 1853.
	Mr. J. Thompson, Kilmarnock .	3,300	46	Glasg. M. Jl. July, 1855.
	Drs. Johnston and Sinclair . . .	13,748	200	Pract. Mid. p. 163.
	Dr. Hall Davis . .	13,783	15	Difft. Parturition, p. 339.
	Dr. R. U. West . .	2,083	2	Assoc. Jour., July, 1853.
	Mr. Harrisson . .	1,000	11	Brit. Med. Jour.
	Dr. Cross	4,733	39	Do.
	Mr. Smart . . .	5,026	32	Lancet, Oct. 13, 1860.
	Dr. Lawrence . .	1,000	28	Ed. Med. Jl. Feb. 1863.
	Mr. Harper . . .	6,053	302	Obs. Trans. vol. 1, p. 174.

b. *Among French and Italian Practitioners.*

Date.	Authors.	Total No. of Cases.	No. of Forceps Cases.	References.
1797 to 1809	Madame Boivin . .	20,517	96	Mémorial, p. 337.
1803 to 1811	Madame Lachapelle	22,243	174	Prat. des Accouch.
1808	M. Ramboux . . .	216	2	Velpeau.
1815 to 1828	M. Pigeotte de Troyes	1,362	2	Do.
1829	M. Papavoine . . .	24	1	Do.
1829	Hôtel Dieu, Paris .	280	1	Do.
1830, 1831	Sig. Ciniselli . . .	94	1	Do.
1834 to 1843	Dr. de Belli . . .	2,739	62	Ranking, vol. 4, p. 184.

e. *Among German Practitioners.*

Date.	Authors.	Total No. of Cases.	No. of Forceps Cases.	References.
1801 to 1807	M. Richter, Moscow .	3,195	49	Velpeau.
1811 to 1827	Moschner & Kursak, Prague . . .	12,329	120	Siebold's Jour. vol. 9.
	M. Boer, Vienna . .	29,961	119	Arneth, p. 134.
	M. Klein	35,417	730	Do. p. 135.
	M. Bartsch	4,425	61	Do.
	Prof. Schwerer . . .	21,804	194	Ranking, vol. 5.
1812 to 1813	C. v. Siebold, Wurtzburg	318	26	Siebold's Jl. vol. 1 to 3.
1817 to 1826	Do. Berlin . .	1,634	212	Do. vols. 3 to 8.
1827 to 1829	E. v. Siebold, Berlin .	491	77	Do. vols. 9 to 11.
1829 to 1833	Do. Marburg .	344	34	Do. vols. 10 to 13.
1834 to 1837	Do. Göttingen	507	37	Do. vols. 15 & 16.
1825 to 1827	Dr. Kilian, Prague .	2,350	120	Velpeau.
1808 to 1814	Dr. Henne, Copenhagen	555	1	Siebold's Jour. vol. 2.
1826	Do. do.	130	4	Do. vol. 8.
1821 to 1825	Dr. Riecke	219,303	344	Velpeau.
1819, 1820	Dr. Ritgen, Giessen .	180	20	Siebold's Jour. vol. 6.
1825	Dr. Merrem, Cologne .	142	5	Do. vol. 7.
1814 to 1827	Dr. Carus, Dresden .	2,908	184	Do. vol. 9.
	Dr. Naegelè, Heidelberg	1,411	22	Velpeau.
1825, 26, 27	Dr. Klugè, Berlin . .	809	55	Siebold's Jl. vols. 7, 8, 9.
1825, 1826	Prof. Andrée, Breslau .	351	8	Do. vols. 7, 8.
1825, 26, 27	Dr. Brunatti, Dantzic	284	22	Do. vols. 7, 9.
1825, 1826	Dr. Theys, Trier . .	49	3	Do. vols. 7, 8.
1826	Dr. Voigtel, Magdeburg	29	3	Do. vol. 8.
1827, 1828	Dr. Küstner, Breslau .	370	8	Do. vols. 9, 10.
1830, 31, 32	Dr. Adelmann, Fulda .	170	7	Do. vol. 14.
1797 to 1837	Dr. Jansen, Ghent . .	13,365	341	Med. Gazette, March 6, 1840. Schmidt's Jahrbücher.
1847 to 1849	Dr. Arneth, Vienna .	6,608	45	Die Geburtsh. Praxis, p. 92.
1821 to 1842	Dr. Rieker, Nassau .	304,150	4223	Med. Times and Gazette, Oct. 11, 1856.
1858	Vienna Hospital . .	8,358	131	Brit. and For. Med.-Chir. Rev. July, 1860.

Thus among British practitioners we find 1017 forceps cases in 174,020 cases of labour, or about 1 in 171.

Among the French, we have 339 forceps cases in 47,475 labour cases, or about 1 in 140.

And among the Germans, 7205 forceps cases in 763,951 labour cases, or about 1 in 106.

If we add the whole together, we find 8561 forceps cases in 985,446 cases of labour, or about 1 in 115.

RESULTS OF THE OPERATION TO MOTHER AND CHILD.

Authors.	No. of Forceps Cases.	Mothers lost.	Children lost.
Dr. Smellie	52	2	9
Mr. Perfect	18	2	4
Dr. Jos. Clarke	14	2	Not stated.
Dr. Merriman	21	0	6
Dr. Granville	5	1	Not stated.
Dr. Ramsbotham . . .	140	4	,,
Edinburgh Lying-in Hosp.	15	Not stated.	5
Dr. Maunsell	4	0	1
Dr. Beatty, sen. . . .	111	0	0
Dr. Gooch	6	1	0
Dr. Ashwell	6	Not stated.	3
Mr. Warrington . . .	1	0	0
Dr. R. Lee	42	3	31
Dr. Collins	24	4	8
Dr. Thos. Beatty . . .	8	0	5
Dr. Churchill	9	0	0
Drs. Hardy and M'Clintock	18	5	8
Dr. F. Ramsbotham . .	73	3	17
Dr. Murphy	4	0	1
Dr. Pagan	82	9	19
Dr. Roberton	43	0	7
Dr. Storer	8	0	3
Dr. R. U. West . . .	2	0	0
Mr. Harrisson	11	0	2 P.
Mr. Smart	30	0	13
Dr. Lawrence	28	1	4
Mr. Harper	302	2	43
. . . . . .	232	0	28
Dr. Hall Davis	15	0	3
Mr. J. Thompson	46	0	2
Drs. Johnston and Sinclair	200	11	29
Mad. Boivin	96	Not stated.	20
Mad. Lachapelle	79	14	23
Dr. Boer	19	2	5
Dr. Siebold	312	11	47
Dr. Ritgen	20	3	4
Dr. Andrée	8	1	4

Authors.	No. of Forceps Cases.	Mothers lost.	Children lost.
Dr. Brunatti	23	1	6
Dr. Voigtel	3	0	0
Dr. Küstner	8	2	1
Dr. Adelmann	7	1	1
Prof. Schwerer	194	7	48
Dr. Arneth	45	7	14
Dr. Ricker	4223	93	684

Now if we add together the number of forceps cases where the result to the mothers is stated, we shall find, that of those detailed by British practitioners, of 1201 forceps cases, 41 mothers were lost, or 1 in 29.

Amongst the French and Germans, in 4941 cases, 142 mothers were lost, or about 1 in 34.

Whilst of the children, the British statistics give 207 lost in 1082 cases, or about 1 in 5; and foreign statistics 858 in 5037 cases, or about 1 in 5.

The total result is, that in 6142 forceps cases, 183 mothers were lost, or about 1 in 33; and in 6119 cases, 1065 children were born dead, or about 1 in $4\frac{3}{4}$.

It is greatly to be regretted that the statistics of the result of the operation to the mother and child are so limited. Many writers who have carefully recorded the *number* of operations, have very carefully omitted to state whether the mother recovered, or the child was saved, leaving us to make the inference that both were saved. But we know that such an inference would be incorrect. Can anyone believe, that whilst British practitioners lose one woman in twenty-one, Mad. Boivin and M. Baudelocque lost none at all? I have, therefore, omitted or marked in the latter Table all those who have neglected to state the results.

To those who, like myself, regard the wider employment of the forceps as the best mode of diminishing the frequency of the employment of craniotomy, it is a matter of rejoicing to find this instrument increasingly employed, and that with each enlargement of our statistics, the death-rate for the mother and child has diminished.

I am unable to explain the greater proportional frequency of operations in some of the German reports, except by supposing that their hospitals, being on a small scale, are reserved for the worst cases met with in extern practice among the poor. Were I quite sure of this being the case, however, I should have omitted them from Table I., as they would then manifestly be an unfair record of the proportional frequency of the operation.

It would be unjust to compare the frequency of forceps cases among the Germans and British, without recollecting the minor degree of mortality amongst the children in the practice of the former, and the very much smaller number of crotchet cases. It would seem, that although the Germans use the forceps much more frequently than we do, they often thereby avoid a much more fatal operation.

The rate of mortality exhibited by the last Table is undoubtedly an over-estimate, as many of the deaths included in it were unconnected with the operation; but as this is not stated, except by a few authorities, though probably equally true of all, I have preferred quoting the numbers given, and appending this note.

If it were possible to collect a sufficient number of cases from private practice, I have no doubt that our estimate of the value of the forceps would be at once truer and much more favourable. For example, Dr. Beatty's cases in the foregoing table occurred chiefly in private or consultation practice, and we find that in 111 cases he lost neither mother nor child.

Mr. Crosse used the forceps in 23 cases; the mothers all recovered: 7 children were still-born, and 3 died soon after birth.

I can add to these 99 operations either in consultation or in my private practice; out of these, 2 mothers died subsequently of puerperal fever, which was epidemic at the time; in both, the operation was extremely easy and quick. All the children were saved but eleven; of these two were putrid, one had the funis prolapsed, one occurred in a case of convulsions, four breathed but soon sank, and three were dead born.

Dr. R. U. West's 2 cases, I presume, were private ones: the mother recovered; the children were saved.

Mr. Harrisson's 11 mothers recovered; 2 children were putrid.

Of Mr. Smart's 32 cases, the mothers all recovered, but 13 children were lost.

Of Dr. Lawrence's 28 cases, 1 mother and 4 children were lost.

Of Mr. Harper's 232 cases, all the mothers recovered; 28 children were lost.

Of 39 cases related in detail by Dr. Hall Davis, from private or consultation practice, all the mothers recovered, and 34 children were saved.

Whether these were all private cases or not, it shows that the mortality of the forceps operations is much less than that afforded by hospital statistics, for we see that in 577 cases only 3 mothers were lost, and 68 children.

If we fail in our endeavours to extract the infant with the forceps, we have no resource but to employ the perforator and crotchet; and, therefore, in estimating the *utility* of the forceps, we must also compare it with its *alternative* operation, inasmuch as every successful case of the former may be considered as so much gained from the latter.

Now, in craniotomy all the children are destroyed, and one in five of the mothers is lost; whereas we have seen, that by the forceps we lose only one in five of the children, and one in thirty-three of the mothers.

The special *advantages* of the forceps are said to be:

1. That they are easily applied.

2. That their powers are calculated to attain the object for which they are used.

3. That they do this by imitating the natural powers.

4. That they aid the expulsive efforts of the uterus better than any other instrument, and supply their place, which no other instrument can.

5. That they are less liable to slip than the vectis.

6. That they are attended with less fatal consequences than the perforator and crotchet.

On the other hand, those writers who have defended the use of the vectis, as compared with the forceps, have enumerated several *disadvantages* of the latter—such as,

1. The difficulty of their application in all cases, and in some, the impossibility of using them, owing to the position of the head or want of space.

That the introduction of two blades may be more difficult than that of one, in *certain* cases, is very evident, but that there is much greater difficulty in introducing the forceps than the vectis, in the majority of cases proper for its use, I do not believe. The latter part of the objection is of no force, because those cases where the introduction of the instrument is impracticable are not cases in which its employment is contemplated, and, undoubtedly, if the impaction were so great as to prevent the application of the forceps, it would more surely render the vectis impotent.

2. The risk of bruising the os uteri in the application of the forceps.

I do not think that there is much risk, if the operator be a competent person. Dilatation or dilatability of the os uteri being an essential condition of the operation, the supposition would involve great want of skill and care in the operator.

3. That when the forceps are applied, they are apt to slip and lose their hold.

This may sometimes happen, but it is much more likely to occur with the vectis.

4. That the pressure upon the child's head may destroy life.

No doubt; but as the pressure is regulated by the resistance, this ought never to happen, except in cases in which the crotchet must otherwise be used, and in which the vectis would be powerless.

5. That by adding to the volume of the head, they are apt to lacerate the perineum.

That the compression exercised upon the head of the child is amply sufficient to compensate for the additional bulk of the blades, there can be no doubt, even in those cases where the extraction is most easy; but we have an additional safeguard in the removal of one of the blades just before the head passes over the perineum.

6. That as they can never be used secretly, they have a tendency to alarm and intimidate the patient, and in this respect are inferior to the vectis.

When speaking of the vectis, I mentioned its secret employment among its disadvantages; and I now quote this objection, for the purpose of entering once more my earnest protest against the employment of any instrument secretly.

Having now given the history of the operation, stated its objects, and shown that they are attainable, from the nature of the aid afforded, and from numerical calculations; and having enumerated the positive and comparative advantages of the operation, with the objections that have at different times been made to the use of the instrument, I shall next proceed to mention the *cases to which the forceps has been considered applicable.* I would wish, however, that it should be remembered, that as I am not writing the history of my own experience only, but that of others, so I am not to be considered as necessarily the advocate of the forceps in all these cases. I have selected them from authors of the highest authority, and their evidence is altogether independent of support from me.

I must also premise, *that in no cases is the forceps* (or, indeed, any instrument) *to be applied, until we are perfectly satisfied that the obstacle cannot be overcome by the natural powers, with safety to the mother and child.* This limits the operation in one direction; *the other limit is determined by the impossibility of extracting the child without laceration or serious contusion of* *the soft parts in the pelvis,* as this would involve great injury and peril to the mother without saving the child, as the compression involved would almost certainly destroy it. As a general rule, if the child be dead, craniotomy is preferable to the forceps.

1. When the head is unable to enter the brim of the pelvis from mal-position (suppose with its long diameter corresponding to the antero-posterior diameter of the upper outlet), which is not rectified by the pains, the long forceps may be applied to change the position, provided the os uteri be fully dilatable, and that the change cannot be made by the hand alone.

2. When the head is in the upper outlet, fitting closely, but not impacted, and the pains are inadequate to overcome the resistance, a little help with the forceps, applied laterally or obliquely, will often overcome the difficulty.

3. When the head, presenting at the brim, is somewhat too large for the antero-posterior diameter of the pelvis, if the excess be not more than may be remedied by the allowable degree of compression, the operation may be successful. It will require some experience to ascertain this, before a trial, and great skill and care in making the trial; but as the alternative is turning or the crotchet, it is surely worth while to make a cautious attempt with the forceps, from which no harm need result in case of failure.

In all these cases it will be necessary to use the long forceps; in the following, the shorter are sufficient, but, of course, either may be employed.

4. When the head is in the cavity of the pelvis, and is there detained by want of space, if *the compression required for its extraction be not greater than the head of the child will bear with safety, and the violence to the soft parts of the mother in extraction be not such as necessarily to injure her,* the forceps may be safely used, either laterally, obliquely, or antero-posteriorly. Siebold is said to have been able to reduce the transverse diameter of the head of the child six lines with Levret's forceps; Osiander, nearly an inch; Baudelocque, four and a half lines; Thouret and Velpeau, five or six lines; and Flamant, five and a half lines. Of course the amount will be in inverse proportion to the degree of ossification.

5. In face presentations, the longest diameters of the child's head are brought to bear upon the pelvis, adding greatly to the difficulty of its transit through the lower outlet, even when the pelvis is large, and still more if it be under the average dimensions. In such cases, aid may often be given by the forceps, so as to save the child's life, and to mitigate the suffering and its consequences

to the mother. It is not, however, to be assumed, that because the child descends face-ling, assistance will be necessary; the majority are delivered by the natural efforts.

6. The same observations apply to certain, though more rare, cases, when the forehead is turned towards the symphysis pubis.

7. But the utility of the forceps is seen more clearly in those cases in which the pains, at first very strong, have gradually declined so as to be nearly or altogether powerless, but not from the resistance occasioned by a narrow pelvis. There may be sufficient space, the os uteri and external parts well dilated, and yet the labour does not advance. In such a case, the second stage cannot be very much prolonged without certain symptoms arising, indicative of danger to the mother; and here we are able to relieve her without difficulty or risk, and to save the child (if it be alive) by the timely use of the forceps. In such cases (and every one must have met with them) I think I may say, that the operation adds absolutely nothing to the danger either to mother or child.

8. When the hand or arm descends with the head, the additional bulk will require more expulsive force, and occasionally, aid must be afforded by the forceps.

9. In some cases of convulsions, hæmorrhage, and rupture of the uterus, where the head is within reach, the forceps are found extremely useful in expediting the delivery.

10. In certain cases of breech presentation, it is very difficult to extract the head after the body is expelled, either from malposition, or from the incompressibility of the base of the skull; in these cases the difficulty may be removed or overcome by the forceps.

11. The forceps may be used after vaginal hysterotomy or symphyseotomy.

12. In prolapse of the funis, when it is an object to hasten the labour, in order to save the child. The pulsation of the cord will show whether the operation affords a chance.

13. When, from the results of repeated auscultation, we are satisfied that the action of the fœtal heart is becoming dangerously weakened, provided there be space enough, I have no hesitation in hastening the conclusion of labour by the forceps.

14. In certain diseases of the heart and lungs, we may save the patient much risk by doing so. In one case of extensive valvular disease of the heart, where the effect of the bearing-down efforts upon the circulation was much to be feared, I hastened the delivery with good effect, and also in a case of phthisis.

These are, I believe, all the cases in which the forceps have been used or recommended by high authority; to complete the subject, I may mention certain cases in which they ought not to be employed.

1. In distortion of the pelvis, or when its calibre is diminished from any cause, such as tumours, exostosis, &c., if the narrowing of the pelvis be too great to admit of the passage of the child's head, when moderately compressed; these cases can only be terminated by the perforator, or hysterotomy.

2. When the os uteri is rigid and undilatable, or when the passages are much inflamed or swollen, the forceps ought not to be used.

3. In some cases, where the patient has been mismanaged, and allowed to remain too long, the system is in such a state that we are obliged to have recourse to the most expeditious mode of delivery. In these cases, if there be a strong doubt of success with the forceps, it may be wiser to have recourse to the perforator, more especially as, in such cases, the child is generally dead. But such cases could scarcely happen under the care of a well-educated practitioner, nor are they at all frequent.

4. If the child be dead, we are advised to prefer craniotomy. If we are quite certain that the child is dead, the principal objection against craniotomy is removed, and the operation is easier and safer than the forceps; but this is not always easy to determine. The stethoscope is a most valuable source of information; but it must be remembered, that while its positive evidence is unquestionable, the negative evidence (*i.e.*, no sign being audible) is not equally conclusive. Dr. Collins, whose experience has been very extensive, remarks: "I know of no case where the advantage derived from the use of the stethoscope is more fully demonstrated than in the information it enables us to arrive at, with regard to the life or death of the fœtus, in the progress of tedious and difficult labours."

We next come to consider the *period for operating*. "It is one of the nicest points in practice, correctly to decide, whether any given case of protracted labour may be trusted with safety to the further exertions of the natural agents, or whether the means of art ought to be promptly brought to their assistance. In determining this important question, the whole of the symptoms are to be collectively and severally considered, and their different tendencies accurately examined, that we may equally escape the imputation of haste and indiscretion on the one hand, and of delay and indecision on the other; yet, let us ever bear in mind, that more injury may possibly accrue from too long delay, than from premature assistance."*

The decision of this point must, in a great measure, be left to the judgment and experience of the practitioner. No very definite rule can be laid down: we find both individuals and nations differing upon the subject; the Germans operate more frequently, and at an earlier period than the British, but, on the other hand, they have fewer crotchet cases. And it must be admitted that until lately we have been too much afraid of the forceps, and have allowed cases to become the subjects of craniotomy, which, at an earlier period, might have been safely delivered by the forceps.

In forming our decision, there are several points for consideration:

1. The local circumstances of the case, such as the position of the head, space in the pelvis, complications, &c.; these constitute the principal grounds of necessity for the operation, and have been enumerated.

2. The general condition of the patient, and the presence or absence of the symptoms of a prolonged second stage; if present, their amount, urgency, rapidity of development, &c.

Our great object in the use of the forceps is to anticipate these formidable symptoms, and to rescue the patient from the danger. I think, then, that as regards the mother we may conclude:

1. That as these formidable symptoms are not consequent upon a prolonged first stage, therefore, before the completion of the first stage of a labour—that is, before the os uteri is perfectly dilated, and the membranes broken—the use of the forceps cannot properly come into contemplation. But I would remark, that when the obstacle is at the upper outlet, the second stage virtually commences when the os uteri is fully dilatable, as the head *cannot* pass through it, and the usual symptoms may arise if the labour be sufficiently prolonged.

2. That when the second stage has lasted so long as to prove the inadequacy of the natural powers, or at all events, so soon as the symptoms of a prolonged second stage make their appearance (quick pulse, dry tongue, fever, &c.), then we ought promptly to interfere. "A practical rule has been formed, that the head of the child shall have rested for six hours as low as the perineum—that is, in a situation which would allow of their application before the forceps are applied, though the pains should have altogether ceased during that time." The symptoms, however, are a surer guide than the duration of the labour merely; some

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* Ramsbotham's Practical Observations on Midwifery, vol. i. p. 256.

patients will show more signs of suffering after six hours, than others after twelve or sixteen. Dr. Collins observes: "Let it be carefully recollected, at the same time, that so long as the head advances ever so slowly, the patient's pulse continues good, the abdomen free from pain on pressure, and no obstruction to the removal of the urine, interference should not be attempted, unless the *child be dead.*" With great respect, I think this rule defective: to a certain extent it is true, but it is not the whole truth, for there are many cases which continue exactly in this state until powerless labour sets in, and in which, from the character of the labour, it may be certainly foreseen that these symptoms will arise, and that the woman will not previously deliver herself. In all such cases I would maintain that the forceps should be used so soon as we feel justified in coming to that conclusion.

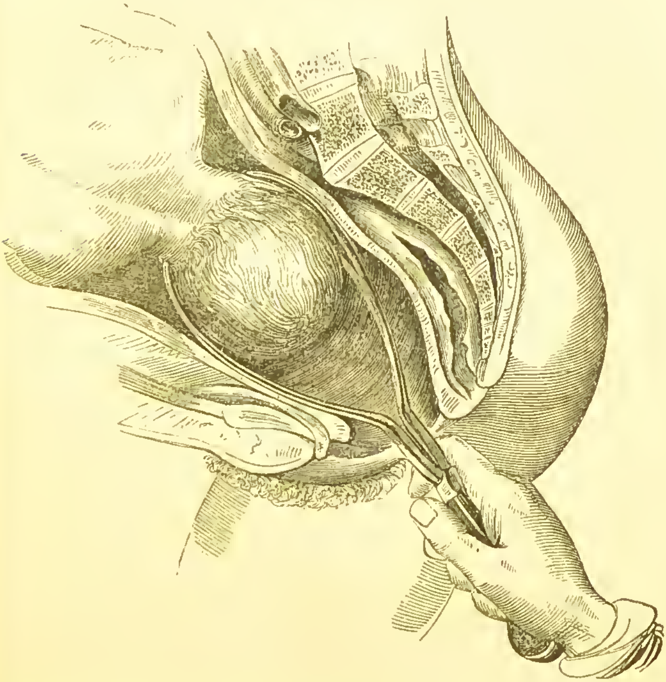
3. The life of the child is a very important element for our consideration. After the second stage has lasted a certain time, there is considerable risk to the child, and it may even die before the symptoms on the part of the mother become very formidable, though this is not generally the case. This condition may sometimes be detected by the stethoscope, the action of the heart becoming feeble and irregular. In such a case, as I have already said, if no counter-indication existed, it would be our bounden duty to interfere for the purpose of saving the child's life, provided the operation were practicable.

METHOD OF OPERATING.—When once we have determined upon the propriety of operating, the operation itself is not very difficult; it requires a thorough *tactile* knowledge of the pelvis, some manual dexterity, and steadiness. I shall first describe the application of the long forceps at the brim, and then (the long or short forceps) in the cavity of the pelvis.

1. *The long forceps.*—These may be applied either in the transverse, oblique, or antero-posterior diameter of the pelvis. If our object be compression or a change of the position, the antero-posterior diameter (fig. 80) will be the best; but if necessary they may be applied in the transverse, or still better in the oblique, diameter (fig. 81) of the brim. In this position, as there is more space, their application is more easy; but it must be remembered, that in proportion to the grasp we take of the head in its longitudinal diameter, we diminish that diameter, but increase the transverse, and so may add to the difficulty of the descent of the head. Therefore, only sufficient force should be used to enable us to extract. "When about to apply the long forceps, it is to be remembered that the difficulty exists at the brim of the pelvis, that the antero-posterior diameter, or that

from the symphysis pubis to the promontory of the sacrum, is diminished; in the application of the instruments, therefore, care should be taken that they be placed over the head, in such a situation that they may occupy the most roomy part of the pelvis, which will be its lateral diameter. In a natural presentation and situation, one blade of the instrument will consequently be placed over the forehead, the other over the occiput."* Sir James Simpson considers the oblique diameter as the best, and indeed the only proper situation in which to apply the long forceps, at the brim,† as in the accompanying plate. (Fig. 81.)

Fig. 80.



The patient is to be placed on her left side (or on her back), close to the edge of the bed; the forceps, warmed and oiled, are to be within reach, and the operator should introduce two or three fingers of his left hand, or his whole hand, during an interval of pain, along the head of the child within the os uteri, for the purpose of protecting it, and guiding the blade of the forceps. The upper or anterior blade is then to be passed along the inside of the fingers or hand, in the axis of the upper outlet, until it glides over the part of the head to which we wish to apply it. It is then to be retained *in situ* by an assistant, and the hand or fingers withdrawn; the right hand (or two fingers) is next to be introduced on the opposite side, and the second blade passed carefully up, and applied to the head. If the blades have been properly placed, they will lock; but if not, one must be withdrawn, and re-introduced. When locked, the handles may be tied together or grasped firmly, and the extracting force applied, of which I shall speak presently.

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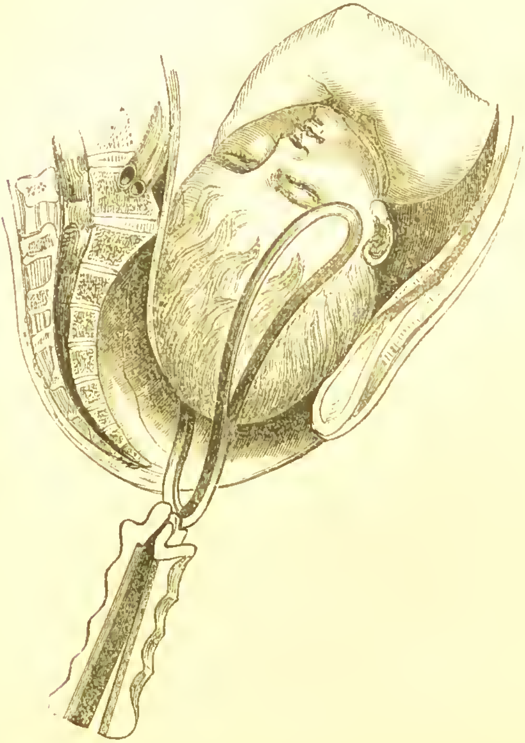
* Waller's edition of Denman, p. 279, note.

† Proceedings of Edinburgh Obstetric Society, Seventh Session, p. 17.

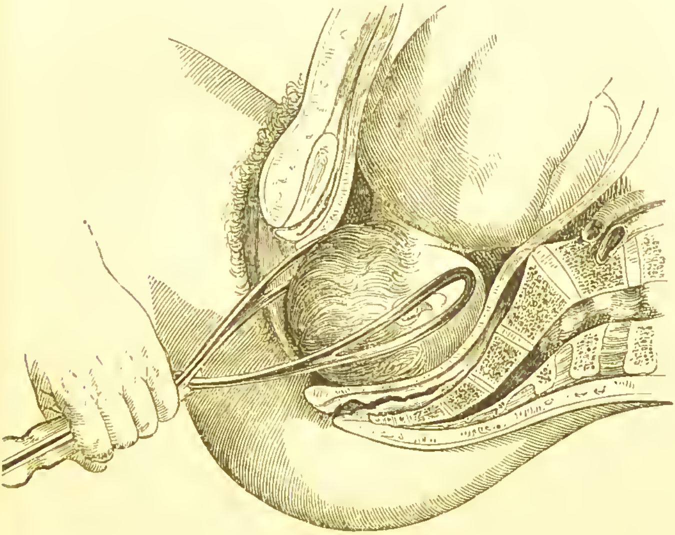
Fig. 81.



The most important points to remember in the application of the long forceps are:—

1. To guard the os uteri with one hand.
2. To introduce the upper or anterior blade first.
3. To pass the blades in the axis of the upper outlet.
4. To regulate the force of the grasp, according to the circumstances of the case.

Fig. 82.



(*From Maygrier.*)

II. *The short forceps.*—These may be passed in accordance with the transverse, oblique, or antero-posterior diameters of the pelvis. In many cases it is impossible to introduce them laterally, but it is always possible, and in my opinion by far the best way, to introduce the first blade under the arch of the pubis, and then give it an oblique position; introducing the second or posterior blade opposite to it, which is not difficult. Thus applied, we shall be quite as able to extract, but we must bear in mind the observation made when speaking of the long forceps, that pressure in the long diameter of the child's head increases its lateral or transverse diameter, and so far augments the difficulty of its extraction.

The bladder and rectum should be evacuated before the attempt is made, and the forceps warmed and oiled, as already mentioned. The patient is then to be placed near the edge of the bed, and, after a careful examination, our decision formed as to the part to which the instrument is to be applied. One or two fingers are then to be introduced into the vagina, during an interval of pain, to guide the forceps and protect the soft parts.

We must always be careful that "the point of the instrument be constantly kept in contact with the head; to effect which, it will be necessary to remember that the child's head is in every part convex, and, therefore, as the instrument advances, the handle must be raised, or otherwise in its progress it may pass on, instead of going under, the os uteri, if any part should remain in contact with the child's head."*

The forceps must be introduced at first in the axis of the lower outlet, but this direction must be almost immediately changed into that of the upper outlet, or there will be danger of wounding the posterior wall of the vagina. The upper or anterior blade should be introduced first, and then the lower or posterior one. When both are applied, they ought to be opposite, and if so, will easily lock; but if, on endeavouring to lock the forceps, it should be found that they do not readily come together, they have not been properly introduced: no force or violence should be used to bring them together, but the second blade should be withdrawn, and introduced afresh. Great care must also be taken that the soft parts, or hair, are not included in the lock, as this will give great pain. The lower part of the handles may be tied together by a ligature, so as to determine the force of the grasp, which has this advantage, that it fixes the degree of compression, and leaves the operator at liberty to occupy himself with the extraction only. If, however, the head fit tightly, and more compression than merely that which is sufficient for extraction be necessary, it will be useless: the operator must then regulate the compression with his hand, and extract at the same time. "When the forceps are first locked, they are placed far backward, with the lock close to, or just within, the internal surface of the perineum; and they can have no support backwards except the very little which is afforded by the soft parts. The first action with them should therefore be made by bringing the handles, grasped firmly in one or both hands, to prevent the instrument from playing upon the head of the child, slowly towards the pubes, till they come to a full rest. Having waited a short interval with them in this situation, the handles must be carried back in the same slow but steady manner to the perineum, exerting, as they are carried in the different directions, a certain degree of extracting force; and after waiting another interval, they are again to be raised towards the pubes, according to the situation of the handles."* We must remember "that the force employed in extracting the head be always and steadily from blade to blade, but with intervals resembling the labour pains, and constantly in the direction of the axis of the pelvis, till the occiput begins to emerge from under the arch of the pubis, when the handles are to be raised over the symphysis pubis with the right hand, while the left is applied to strengthen and preserve the perineum."† I believe that the facility of extraction depends very much in drawing the head well down in the axis of the lower outlet, in the first instance, and then carrying it well forward under the pubic arch, and this, whether the forceps be applied laterally or obliquely. The whole power or force which the instrument enables us to use ought not to be exerted in the first instance, but such a degree as any individual case may require, which can only be known by first trying a moderate degree of force, increasing it slowly and deliberately, according to the exigence of each case.

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* Osborn, Essays on Parturition, p. 99.

When we thus employ the power we possess gradually, steadily, at intervals, and in the direction of the axes of the pelvis, we must not forget the danger (in some cases at least) from pressure or contusion. Our guide in this matter is the pulse, which rapidly rises if injury be inflicted. "If the pulse be 120 or 130 before you commence operations, it is clear that you cannot, from counting the beats, take an intimation whether the soft parts have or have not sustained injury; but if, before the forceps be applied, the pulse is under 100 in the minute, then, should contusion be produced by your efforts with the instrument, the rise of the pulse will indicate it. After every effort with the forceps, therefore, count, waiting two or three minutes, so as to allow the beats to subside after muscular exertion, and count completely round the circle. If you find it below 100, no serious injury has been inflicted; if the frequency is increasing, although it does not necessarily follow that serious injury has been inflicted, yet the existence of contusion becomes probable, and further efforts must not be made without much consideration."‡

When our efforts have been so far successful, that the occiput emerges from the lower outlet, if there be pains, it is better to remove one blade (the posterior one, when they are applied antero-posteriorly) of the forceps, to lessen the risk of laceration, and the perineum should be carefully supported by an assistant, whilst the operator uses the other blade as a tractor, if necessary. If the head be high up in the pelvis, we must take care that the usual half-turn be made as it descends, so as to bring the face into the hollow of the sacrum.

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* Denman's Introduction, p. 281.

† Osborn, Essays on Parturition, p. 100.

‡ Blundell's Principles and Practice of Obstetricy, p. 505.

In breech cases, when the head is detained, the operation is not very different; the blades are to be passed up antero-posteriorly, or laterally, and locked across the chin, or back of the head, and the extracting force applied, gently, firmly, and at intervals, not forgetting the natural turns, so as to bring the face into the hollow of the sacrum, if possible.

Difficulties.—"The difficulty of applying the forceps," says Dr. Denman, "is most frequently occasioned by attempting to apply them too soon; or passing them in a wrong direction; or by entangling the soft parts of the mother between the instrument and the head of the child, against all which accidents we are to be on our guard."

1. The first difficulty we meet with is in the introduction of the blades. There may not be space enough, and if we find this to be the case, after a fair and careful trial, we are not to persist at the risk of injury to the mother, but craniotomy must be performed.

When the head is pressed down against the tuberosities of the ischia, there will often be difficulty in passing the blades between them; and if the head cannot be raised up during an interval of pain, the forceps had better be applied antero-posteriorly, or both blades being introduced posteriorly, we may gradually slip them to either side. I do not speak of the difficulty of applying the forceps when the os uteri is rigid, because it should never be attempted.

2. As I have already mentioned, there may be some difficulty in locking the blades, and then one of them must be withdrawn and re-introduced. It is quite possible to deliver the child without locking the blades, but there is more chance of injury, and the instrument is more apt to slip.

3. The extraction may be difficult, or even impossible. The great value of experience in such cases is, that it teaches us how far we may carry our efforts without injury. Perhaps a little more compression, or a little more force, may crown our efforts with success, provided that it do not exceed safe limits. But great care and caution will be necessary, and if we find our efforts fruitless after a fair trial, we shall then be justified in having

recourse to the perforator, nor will the patient be the worse for the failure with the forceps, if the attempt have been judiciously made.

The principal *dangers to the mother* are:

1. In the introduction of the blades, if it be not effected in the axis of the upper outlet, the vaginal parietes may be lacerated, and if the cervix uteri be not guarded by the hand, the blade may be pushed through it, or it may be included between the end of the blade and the child's head. Cases of mal-practice illustrative of these dangers might easily be quoted, but it is sufficient for my purpose to allude to them as a caution.

2. The soft parts in the pelvis may be bruised or lacerated in the extraction.

3. The perineum may be lacerated.

The *dangers to the child* arise:

1. From want of care in introducing the blades, by which the scalp may be bruised or torn, or an ear cut off.

2. From excessive compression, by which the skull may be indented, the bones fractured, or death from pressure induced.

Dr. Blundell has given a distressing picture of the accidents which may result from an incautious or maladroit use of the forceps.

"The grand error you are apt to commit in using the long forceps, is force. In violent hands, the long forceps is a tremendous instrument; force kills the child, force bruises the softer parts, force occasions mortification, force breaks open the neck of the bladder, force crushes the nerves; beware of force, therefore, *arte non vi.* Other errors, too, there are, against which I beseech you to guard. You may use the forceps without heed; you may try to use it when the parts are rigid, and the os uteri not fully expanded; you may attempt to apply it without knowing the position of the head; you may oscillate the instrument too extensively from side to side; you may draw without intermission, instead of imitating the pains; you may close the handles too forcibly by the hand or ligature; you may hurry the head through the outlet; you may neglect to throw the face towards the sacrum; you may forget the perineum; you may fail to conduct the head, when it emerges, towards the abdomen and the mons, by drawing it too much upon the perineum."

After-treatment.—The first symptom which will require our attention, is the shock caused by the operation. If it be great, a combination of opium with ammonia will be found the best remedy, with wine and water in moderate quantity. If it be not severe, perfect quiet will be sufficient, and the subsequent management is the same as after ordinary delivery, with increased caution, however, and daily attention to the state of the vagina. If there be any soreness or inflammation, warm-water injections should be used twice a-day.

It is right here to notice some instruments which have been proposed as substitutes for the forceps. 1. Dr. Conquest many years ago proposed one, consisting of a loop of thin whalebone, fastened into a wooden handle. The loop is easily introduced, and placed over the occiput or chin, and he supposes that sufficient extracting force may then be exerted. When placed over the chin, it may, perhaps; but on trial, I found that over the occiput it had no purchase, but slipped immediately.

2. Sir James Simpson has invented a "sucker-tractor," consisting of a cup of vulcanized India-rubber, which is to be applied over the child's head, or a portion of it, and to which is attached a syringe, for exhausting the air. He has succeeded several times, without injury to the child, but as yet he does not consider the instrument complete. No doubt enormous force may be exerted by it, and if it do not injure the child, it is certainly very safe for the mother.

3. Dr. Evans, of Chicago, U. S., has contrived an instrument consisting of a band, with network strings, which is to surround the forehead, and embrace the head firmly, so as to allow of tractile force being exerted. It is applied by two steel rods (something in the way that the ligature is carried round a polypus by Gooch's canula), which are afterwards joined together.* It is an ingenious instrument, but whether likely to supersede the forceps in any case, I cannot tell.

CHAPTER XIII.

OBSTETRIC OPERATIONS. 5. CRANIOTOMY.

THE next obstetric operation we have to consider belongs to the second class, that is, where one life is terminated to save the other; the mother's safety being secured by the destruction of her child, in cases where *both would be lost* if no interference were attempted. This is not an operation of election in any sense, but of stern and sad necessity; neither have we any choice which life we will save; the child cannot be saved by any means compatible with the mother's safety, and therefore it is destroyed. As to the arguments for and against the morality of the operation, I must refer my readers to the Appendix to this edition, where I have endeavoured to investigate the question fairly and fully. I have seen too many difficult cases to agree with Dr. Tyler Smith that craniotomy can be abolished, but it has always been my object that it should be restricted within the narrowest limits. Professor Scanzoni, no mean authority, observes: "from all we have said, we conclude, that, as yet, we know of no means which will render craniotomy useless. It is an operation which, undertaken on good grounds and performed with address and good instruments, will save many lives, which otherwise would be sacrificed."

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* Ranking's Abstract, vol. ii. p. 275.

The instruments (or part of them) employed in this operation are of great antiquity; and although they were originally proposed for the extraction of dead children only, yet this scruple had not the effect of saving the life of the child, but merely postponed the interference until after its death. This conscientious quibble (refusing to destroy the child, but allowing it to die) was soon detected, and then the hook was used with living children, provided that delivery were otherwise impossible.

The class of cases to which it was applied, doubtless, included a vast number which were subsequently relieved by the forceps; but there were still left a great many in which it was indispensable.

Several of the ancients recommend this operation. Hippocrates advises the breaking up of the cranium, and extraction by the hook. Moschion advises embryulcia in those cases where the fœtus cannot be extracted by the hands, and if embryulcia be insufficient, the exsection of the limbs and body of the child. Albucasis, the Arabian physician, describes instruments for compressing and breaking up the child's head, and others for extracting it. Of certain cases of difficult labour, when the child is presumed to be dead, Celsus remarks, "Si caput proximum est, demitti debet uncus, qui vel oculo vel auri vel ori interdum etiam fronti rectè injicitur."

In the Byrth of Mankinde, written by Eucharius Röslin, translated into Latin about the year 1535, and into English by Thomas Raynalde, in 1634, I find the hook recommended to bring away dead children. "If so be," he says, "that it lie the head forward, then fasten a hook either upon one of the eyes of it, or the roof of the mouth, or under the chin, or on one of the shoulders—which of those parts shall seem most commodious and handsome to take it out by, and the hook fastened to draw it out very tenderly, for hurting of the woman." If the head be too large, it is to be opened with a sharp penknife, or broken in pieces. He also recommends excision of the extremities, if they present (the child being dead), or evisceration, to facilitate the delivery.

Ambrose Paré's work is dated 1579, and it was translated into English in 1634. In it are given plates of different hooks for drawing out the child, and a knife for the excision of the limbs.

From this time we find the operation recommended by every author, but the instruments underwent considerable modification, and the class of cases in which they were used considerably decreased. Of course this latter change was one of the consequences of the invention of the vectis and forceps.

The following are the principal modifications of the instruments for craniotomy:

1. Albneasis describes a species of forceps with teeth, which he terms a "misdaeh, or almisdach," for the purpose of crushing the head, and enabling it to pass.

2. He also gives a plate of a single and double hook, for extracting the child, and of a knife for cutting off the head.

3. Ambrose Paré contrived two kinds of blunt hooks, and a double one with sharp points, for the extraction of the fœtus, and a knife for excision.

4. Maurieeau invented an instrument which he called a "tire tête," consisting of a circular plate of steel, fixed upon a rod. The circular plate was to be introduced into the head (previously opened by a scalpel), and being placed across the opening, traction was to be made. This instrument was never much used, owing to the difficulty of introduction, and its feeble power when introduced.

5. Sir F. Ould's "terebra occulta" consisted of a sharp-pointed rod inclosed in a canula or sheath, and retained by a spiral spring at the lower end. When the handle was pressed upwards, and the resistance of the spring overcome, the point of the instrument protruded a certain distance, but was retracted when the pressure upon the handle was removed. Its application to the head was easy and safe; but it must have been nearly useless, from the small opening it made.

6. Dr. Simpson, of St. Andrew's, invented an instrument which he called a "ring scalpel," for opening the skull. It consists of a loop of steel, through which the finger is to be passed, and from which protrudes a sharp-pointed blade about an inch long, by which the cranium was pierced.

7. M. Mesnard described a crotchet which could be used either double or single, and which was the original of the one in present use. He also gives a plate of a "perce-crane," and a pair of "tenettes à conducteur," that is, craniotomy forceps.

8. Dr. Burton copied Mesnard's double crotchet and "perce-crane" with some slight modification.

9. M. Levret gives a plate of a single crotchet, which was arranged to fit into a socket on the top of another blade for the purpose of protecting the mother, and rendering the purchase more secure.

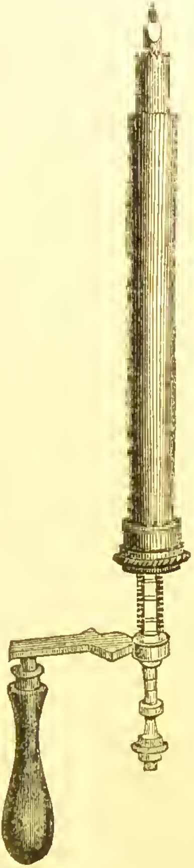
10. Dr. Smellie recommended Mesnard's crotchet (single or double); but, instead of the "perce-crane," he used a pair of strong scissors, with stops at the shoulders to prevent the blades entering too far. Denman abolished the cutting edge altogether, and added strength to the blades. A spoon was also used to evacuate the brain, but it is now very properly discarded.

11. Dr. Wallace Johnson published an account of his instruments for opening the head and extracting the child. I do not know that they have ever been used by any other person.

12. Dr. Aitken proposed a flexible or living crotchet, which could be adapted to the convexity of the child's head.

13. M. Baudelocque recommended a very simple extractor, consisting of a small piece of wood, to the centre of which a ribbon was attached. An incision having been made with a bistoury or "perce-crane," the bar of wood was to be introduced and placed crosswise, and then extraction made by the ribbon.

Fig. 83.



14. M. Osiander has given a plate of an instrument for piercing the skull, and another for extracting. The latter is the same as Smellie's double crotchet.

15. Professors de Hayn, Vanhueval, Joerg,* and other German practitioners, use a species of trephine for perforating the head. It has the advantage of occasioning no splinters, and of perforating the face as easily as the skull. The accompanying plate is

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* Presse Méd. Belge, Dec. 31, 1848.

copied from M. Cazeaux's Atlas, and represents M. de Hayn's instrument. (Fig. 83.)

16. Dr. Davis has invented several species of crotchet, both single and double, as well as a pair of forceps for breaking up the skull. These are well exhibited in the fourth edition of his work.

These are a few of the principal instruments which have been

Fig. 84.

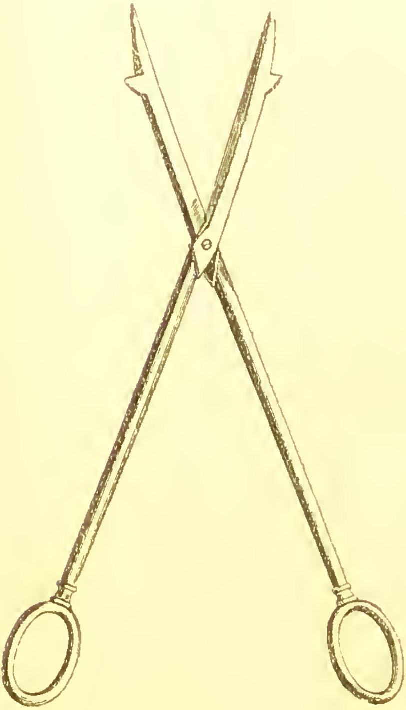
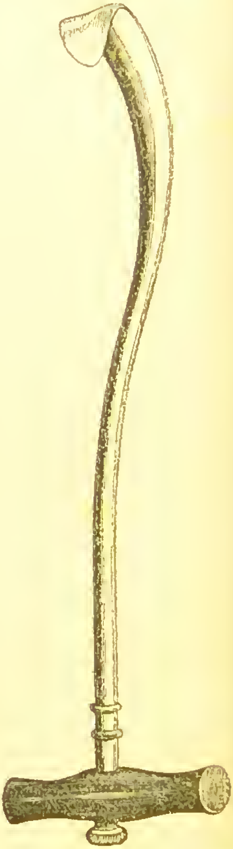


Fig. 85.



employed in the operation of craniotomy. I have not given a detailed description, because most of them are discarded; the instruments in general use being a pair of scissors with shoulder-stops, as recommended by Smellie, but having a sharp edge on the outside (fig. 84), and a modification of Mesnard's simple

Fig. 86.

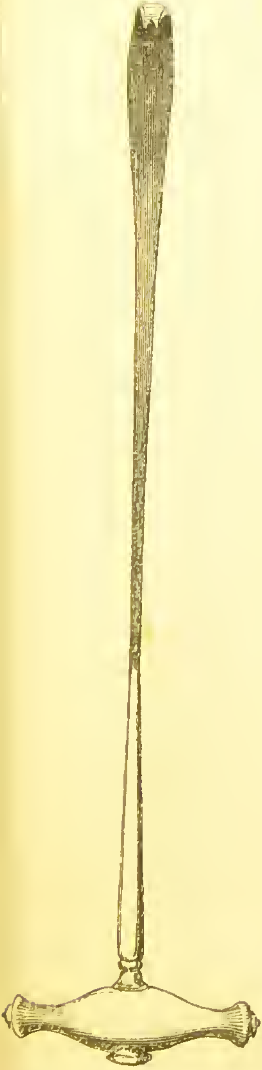


Fig. 87.

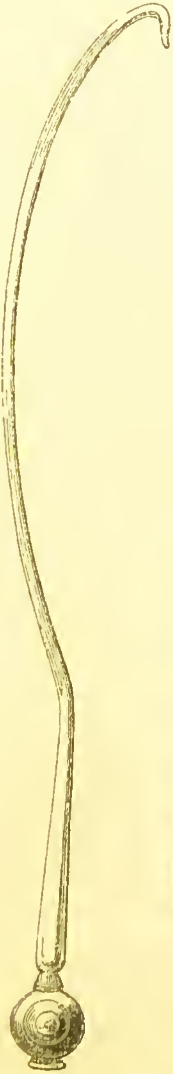
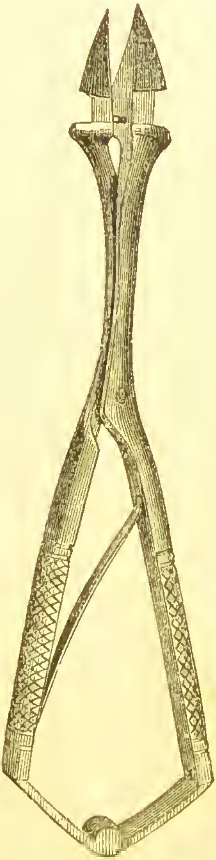


Fig. 88.



crotchet (fig. 85). I have found it an advantage to shorten the points of the scissors above the stops, and also the hook of the crotchet; the latter of which should be slightly cleft (figs. 86, 87). Mr. Holmes, Dr. Halahan, and others have modified the latter, so

Fig. 89.

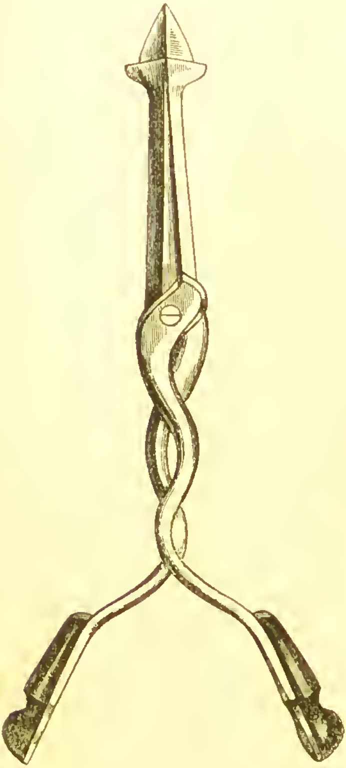
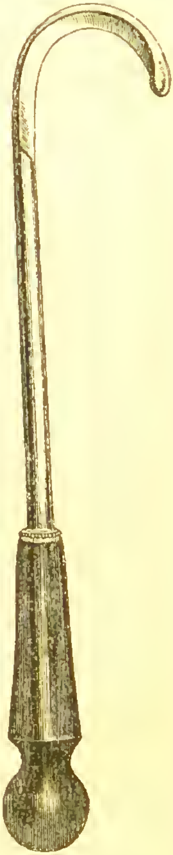


Fig. 90.



that in closing the handles we open the blades (figs. 88, 89). Further, I have copied plates of a knife for cutting off the head or limbs if necessary (fig. 90, from Dr. Ramsbotham, sen.), a blunt hook (fig. 91), and Dr. Davis's bone forceps for breaking up the skull (fig. 92).

Dr. Oldham of London has recently proposed an instrument (fig. 93), which I think likely to be useful. It consists of a straight steel stem, fixed into a wooden handle, and bent at an

Fig. 91.

Fig. 92.

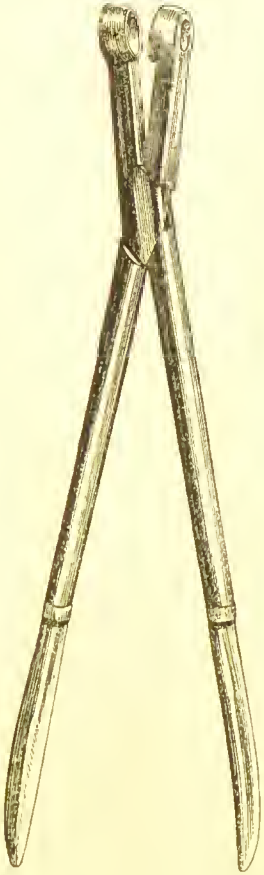
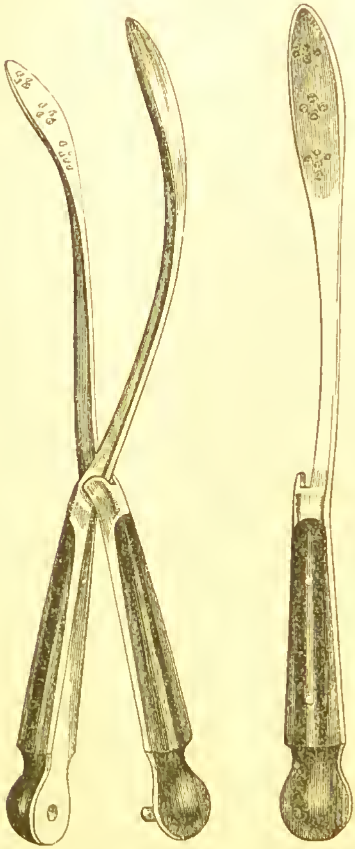


Fig. 93.

acute angle at the other extremity, the whole being fourteen inches long. It can be inserted through the foramen magnum into the spinal canal, and thus obtain a purchase when the vault of the cranium has been broken up. Or it will serve to steady the head when it has been severed from the body, whilst the crotchet is applied.*

From the inconveniences sometimes experienced with the crotchet, and to avoid the risk of injuring the mother, craniotomy forceps have been employed by different individuals.

Fig. 94.



Among the moderns, M. Mesnard has the credit of first inventing and using this instrument, and since his time it has undergone various modifications.

Dr. Haighton used a pair resembling the lithotomy forceps; and since his time Drs. Conquest and Davis, Mr. Holmes, and others, have invented and described varieties of the instrument (fig. 94). The object of each is the same, viz., to avoid the risk of tearing the soft parts of the mother; and the principle of seizing the skull between two blades, furnished with teeth, is also alike.

Dr. Zeigler of Edinburgh has invented an extracting forceps (fig. 95), which must possess great power from the grooved condition of its inner surfaces, and from its figure is adapted to cases of contracted pelvis, when the head has been previously perforated. Both blades are applied outside the cranium, as other forceps; but by substituting for one of these blades another with teeth (fig. 96), a craniotomy forceps of the ordinary kind is produced.†

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* Lancet, May 14, 1853, p. 447.

† Ed. Monthly Journal, May, 1849, p. 770.

I am free to confess that I do not like the craniotomy forceps, although I have tried them repeatedly. They are by no means so manageable as the crotchet; and the interposition of the hand of the operator will always protect the mother from injury by the latter.

Fig. 95.

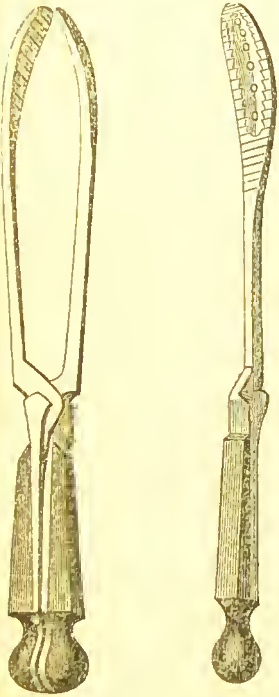
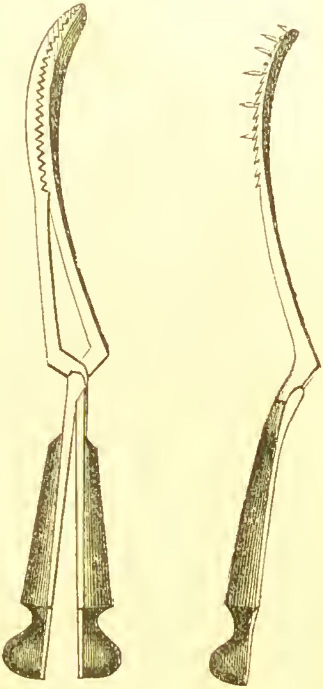


Fig. 96.

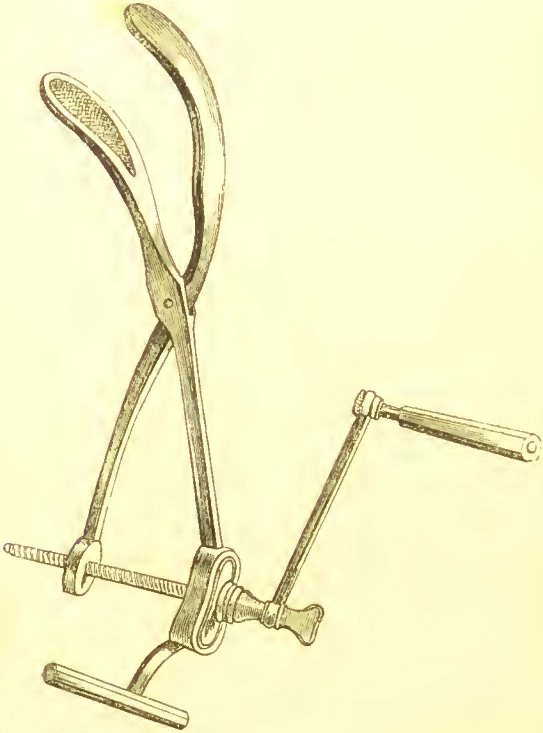


There is one case, however, in which these forceps may be more useful, and that is, when the bones of the head are extremely hard, so that it is almost impossible to fix the point of the crotchet.

17. M. Baudelocque, jun., has invented an instrument, which he calls a "cephalotribe," for the purpose of crushing the head (fig. 97). It consists of a very strong pair of forceps about two feet in length, the handles of which are connected by a screw which pierces them, and which is turned by a handle until the blades are so closed as to effect their object. Velpeau states that instruments somewhat similar have been formerly used by

Assalini, Osiander, Delpech, Colombe, &c. M. Baudelocque is said to have used it three times successfully (and safely as regards the mother) in the year 1832, and once again in 1834. It is also said that M. Champion has tried it with success. MM. Cazeaux,* Pajot, and Hodge, speak favourably of it in certain cases, and with certain modifications.† Sir James Simpson has contrived an instrument which he calls a cranioclast (fig. 98.) It is, in fact, a very strong pair of forceps, and the object is to crush the cranium, so as to facilitate the passage of the head, by presenting smaller diameters.

Fig. 97.



Dr. Barnes has modified this by adding a curve to one of the shoulders, and a screw to the extremities of the handles,* making it to resemble the cephalotribe.

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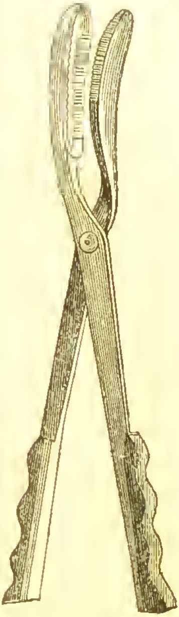
* Traité des Accouchemens, p. 585, Ed. Belge.

† System of Obstetrics, p. 244.

Fig. 98.



The object of the operation of craniotomy is to terminate the labour with safety to the mother, in cases where, from the disproportion between the size of the fœtal head and the pelvis, a living child can neither be expelled by the natural powers, nor extracted by the forceps. Such a case, if left to nature (as it is called) will terminate fatally for both mother and child; consequently, although the child is destroyed to facilitate the delivery, and to save the mother, it cannot be said to be sacrificed, inasmuch as no efforts of ours could have insured its safety.

The case presupposes, on the one hand, *actual disproportion sufficient to prohibit the passage of the fœtal head, even when compressed;* and on the other, *that the distortion is not so great as to prevent the extraction of the child when mutilated.*

Dr. Osborn states, that when "the bones approach much nearer to each other than three inches, it is utterly impossible for a living child at full maturity by any means to pass."† He fixes upon $2\frac{3}{4}$ inches as the diameter rendering craniotomy necessary. M. Alphonse Le Roi says that $3\frac{1}{2}$, Dr. Aitken 3, Dr. Jos. Clarke $3\frac{1}{2}$, Dr. Burns $3\frac{1}{2}$, Dr. Ritgen 2, and Dr. Busch $2\frac{1}{2}$ to 3 inches, is the smallest antero-posterior diameter through which a living child can pass.

As to the other limit of the operation, that is, the smallest diameter through which a child can be extracted after craniotomy, Dr. Osborn remarks:—"Whenever there is a space from pubis to sacrum, or from the fore to the hind part of the upper aperture of the pelvis, equal to an inch and a half, I am convinced it will be always practicable to extract a child by the crotchet, after the head has been some time opened, and the texture of the child's body is softened by putrefaction (as recommended above), and the whole of the parietal and frontal bones are picked away." Baudelocque says that the crotchet is inadmissible when the diameter is only $1\frac{2}{3}$ of an inch; Dr. Dewees, when it is less than 2; Dr. Hull and Dr. Burns believe that it may succeed when the diameter is $1\frac{3}{4}$; MM. Gardien and Hamilton when it is $1\frac{1}{2}$; and Dr. Davis when it is 1 inch. We must not omit, however, another condition—viz., the safety of the mother. It may be quite possible to extract the child as far as mere mechanical extraction is concerned through an aperture extremely small, but what is the result to the mother? In the case related by Dr. Shekleton, where the antero-posterior space was little more than an inch, the child was lessened and extracted, and the mother died "in ten minutes after the operation."* In another case under the late Master, Dr. M'Clintock, where the space was greater, the woman died within twenty-four hours. Now I quite agree with Professor Murphy,† that, where the space is so much reduced, that the mother incurs such peril, in addition to the loss of the child, it would be far better to have recourse to the Cæsarian section. I would not venture to have recourse to craniotomy unless the antero-posterior diameter was fully two inches. M. Cazeaux agrees with this opinion, but decidedly prefers it to the Cæsarian section when the diameter is above this.

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* Obstetrical Trans., vol. iv. p. 278.

† Essays on Midwifery, p. 194.

The *nature of the operation* is simple, but the aid afforded may vary in degree.

1. In the case of dead children, the older practitioners used the crotchet alone as an extracting force, without opening the head.

2. In some cases where the sutures are very loose, the evacuation of the brain will be sufficient, as the bones of the cranium collapse so much under the influence of the pressure downwards, that the child may be expelled by the natural powers. But in this case, it is assumed that the pains are sufficiently strong and frequent.

3. When (as is frequently the case) the pains are inefficient, or when the state of the patient demands prompt relief, then we must not only evacuate the brain, but add extracting force, by means of the crotchet or craniotomy forceps.

4. In some cases the distortion of the pelvis is too considerable to admit the passage of the head, even when emptied of its contents; or the obstruction may result from the ossification of the bones of the skull; in either case, an extension of the operation is necessary to complete the delivery. This may be effected by breaking up the cranium with a small pair of forceps, resembling Dr. Davis's; or, according to M. Baudelocque, jun., by the use of the cephalotribe. It would require unusual hardihood to venture upon the latter instrument in private practice in this country.

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* Dublin Journal of Med. Science, vol. x. p. 287.

† Ibid., Feb. 1859.

and pubis, being from their first conformation so close to one another, that the surgeon can hardly introduce a few fingers between them, it being consequently impossible for the child to come through, is the only case where this operation is to be put in practice."

Burton, in 1751, entered into a more minute detail than any of his predecessors, and gives references to cases. He concludes, that "seeing, therefore, both reason and repeated experience confirm the possibility of success in this operation, nothing should deter a skilful operator from performing it when it is absolutely necessary."*

Smellie, 1751, takes, as usual, a sound common-sense view of this matter: "When a woman," he observes, "cannot be delivered by any of the methods hitherto prescribed and recommended in laborious and preternatural labours, on account of the narrowness or distortion of the pelvis, into which it is sometimes impossible to introduce the hand; or from large excrescences or glandular swellings, that fill up the vagina and cannot be removed; or from large cicatrices in that part and at the os uteri, which cannot be separated; in such emergencies, if the woman is strong and of a good habit of body, the Cæsarian operation is certainly advisable, and ought to be performed; because the mother and child have no other chance to be saved, and it is better to have recourse to an operation which hath sometimes succeeded, than leave them both to inevitable death."†

The operation is described by almost all authors, both English and Continental, but with considerable difference of opinion, both as to its usefulness and the cases to which it is applicable. I shall not, however, occupy the reader with further detail, but again refer him to my researches on Operative Midwifery for those minute particulars which would be misplaced here.

After this short sketch, we may proceed to consider the operation itself, its object, and the means for attaining it.

The *objects* of this very formidable operation are of extreme importance.

1. To afford a chance of escape to the mother, and of life to her offspring, in cases where the child cannot be extracted through the natural passages by any means at our command, or in cases when the extraction, if completed, would be almost certainly fatal to the mother. As to using it as an ordinary substitute for craniotomy, the proposal is simply absurd. If the reader

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* A New System of Midwifery, p. 272.
† Midwifery, vol. i. p. 239, 6th Ed.

will turn to the Appendix, he will find the question investigated at length.

2. To extract the child so promptly, as to afford it a chance of life, when the death of the mother has taken place suddenly.

3. To relieve the mother from the risk of fatal inflammation, owing to the presence of the fœtus in the abdominal cavity acting as a foreign body.

The *nature* of the operation by which these objects are to be effected is simple, viz., that of cutting through the abdominal and uterine parietes, so as to come at the child, and then removing the entire contents of the uterus, and closing the external incision by sutures and sticking-plaster.

But though so simple, it is most dangerous. Wounds of the peritoneum of the simplest kind, though not necessarily and invariably fatal, are very frequently so. In most cases, inflammation of the serous membrane has followed, and in very many it has terminated in death. There is another source of danger. If the wound in the uterus should not be completely closed by its contraction, hæmorrhage to a fatal amount, from the uterine sinuses, may occur, though it is not so frequent as was supposed by the earlier writers. This appears to have been the cause of death in the cases related by Dr. Cooper and Mr. Thompson.

The formidable nature of the operation, however, only makes it the more necessary to ascertain clearly the grounds upon which it is justifiable. It is sufficiently evident, from what has been already stated, that the older practitioners performed it unnecessarily: this is proved, I say, by the fact that the same woman bore children afterwards without assistance. Now, it is an established axiom in midwifery, that the mother's life is not to be compromised in order to save the child. A certain amount of risk may be fairly incurred, but beyond this, the safety of the mother is to be secured, because that is in our power, and if necessary, the child sacrificed, because it cannot certainly be saved without sacrificing the mother. In no cases where the mother's security can be so purchased, can we be justified in having recourse to the Cæsarian section; but there are cases on record, where the pelvic outlets are so narrowed by distortion, that a mutilated child could not be dragged through. In Mr. Thompson's case, the antero-posterior diameter of the upper outlet was only $\frac{7}{8}$ths of an inch. In Dr. Cooper's second case it was $1\frac{1}{4}$, and the transverse diameter of the lower outlet only $\frac{1}{2}$ an inch. In Dr. Young's case, the antero-posterior diameter of the upper outlet was $1\frac{3}{4}$ inch. In a skeleton in Dr.

Hamilton's possession it was only $\frac{3}{4}$ths of an inch. In one of Dr. Hull's cases (Ann Lee), the conjugate diameter, taken from the symphysis pubis to the projection of the sacrum was $1\frac{5}{8}$ inch, and from the acetabula to the projection of the sacrum, $1\frac{9}{16}$ths inch on each side. In the other case (Isabel Redman), the passage was narrower, though the deformity was different. Out of 80 cases, the operation was necessitated by narrowness of the antero-posterior diameter of the pelvis in 62.

Thus it was	1	inch in	1 case.
	$1\frac{1}{2}$	,, in	8 cases.
	$1\frac{1}{2}$ to 2	,, in	23 ,,
	2 to $2\frac{1}{2}$	,, in	25 ,,
	$2\frac{1}{2}$ to $2\frac{3}{4}$	,, in	5 ,,*

It is quite plain that a fœtus, ever so much mutilated, could not pass through some of these pelves, nor through any without great efforts.

Dr. Osborn, who was extremely cautious, and had a great horror of this operation, has fixed $1\frac{1}{2}$ inch antero-posterior diameter, by 3 transverse, as the smallest space through which a child, after evacuation of the contents of the cavities, and the breaking up of the cranium, could be extracted by the crotchet; but others have deemed this impossible. Certainly great risk of injury to the soft parts of the mother would be incurred by the force necessary to drag the fœtus through so small a space, not quite, perhaps, but nearly equal to that resulting from the Cæsarian operation. Moreover, there are cases on record by Drs. Shekleton and M'Clintock, in which a child was extracted through a pelvis whose diameter was about that fixed upon by Dr. Osborn, and the mothers died, one immediately, and the other within twenty-four hours. In such cases, I agree with Dr. Murphy that the risk of the Cæsarian section would be less for the mother, and we should give the child a chance.

I should, therefore, conclude that when, from any cause, the antero-posterior diameter of the upper outlet, or the transverse diameter of the lower, is not fully $2\frac{1}{2}$ inches, there is no possibility of delivery "per vias naturales," with safety to the mother, but that we must have recourse to the Cæsarian section.

STATISTICS.—But it may fairly be asked, what chance does so serious an operation afford to either mother or child? The only mode of answering this question is by adducing the evidence on record. The following tables contain a list of British and American operations, successful and unsuccessful.

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* Velpeau, Traité des Accouch., p. 457.

I. UNSUCCESSFUL CASES.

No.	Date.	Operator, or Authority.	Patient's Name.	Hours in Labour.	Cause.	Results to Mother.	Results to Child.	References.
1	1737	Mr. R. Smith, Edinburgh	Paterson .	7 days	. . .	died	dead	Smellie's Mid. vol. iii. p. 423.
2	1773	Professor Young . .	. . .	. .	. . .	died	alive	MS. Lectures.
3	. .	Dr. White, Manchester .	. . .	. .	. . .	died	dead	Hull's First Letter.
4	. .	Mr. Wood, Edinburgh .	. . .	. .	. . .	died	dead	Ditto.
5	1769	Mr. Thompson, London .	Martha Rhodes	24 hours	. . .	died	alive	Med. Obs. and Enq. vol. iv. p. 261.
6	1773	Professor Young . .	. . .	. .	. . .	died	alive	MS. Lectures.
7	1774	Dr. Cooper, London .	Eliz. Foster .	2 days	moll. ossium	died	alive	Ibid. vol. v. p. 218.
8	1774	Mr. Chalmers, Edinburgh	Eliz. Clarke .	12 days	. . .	died	alive	Hamilton's Outlines, p. 339.
9	1774	Mr. John Hunter . .	. . .	. .	. . .	died	alive	Med. Obs. vol. v.
10	1775	Mr. Whyte, Glasgow .	. . .	. .	. . .	died	dead	Hull.
11	1777	Mr. Atkinson, Leicester .	El. Hutchinson	8 days	moll. ossium	died	alive	Hull, p. 67.
12	. .	Mr. Clarke, Wellingborough	. . .	3 days	. . .	died	dead	Mem. Med. Soc. vol. v.
13	1794	Dr. Hull, Manchester .	Isabel Redman	12 hours	moll. ossium	died	saved	First Letter, p. 162.
14	1798	Ditto	Ann Lee .	10 days	. . .	died	dead	Ditto, p. 172.
15	1795	Dr. Hamilton, Edinburgh	Jean Douglass	2 days	malacosteon	died	alive	Outlines.
16	1798	Mr. Kay, Forfar . .	. . .	3 days	malacosteon	died	alive	Hull's Letter.
17	1799	Mr. Wood, Manchester .	El. Thompson	. .	distortion	died	saved	Mem. Med. Soc. vol. v.
18	1800	Mr. John Bell, Edinburgh	. . .	. .	. . .	died	saved	Med.-Chir. Trans. vol. iv. p. 347.
19	. .	Mr. Dunlop, Rochdale .	Susan Holt .	. .	. . .	died	alive	Hull's Baudeloc, p. 134.
20	. .	Mr. Wood . . .	H. Rheubotham	. .	. . .	died	dead	Med. and Phys. Journal, vol. vi. p. 346.
21	. .	Dr. Kellie, Leith . .	. . .	24 hours	. . .	died	dead	Ed. Jour. vol. viii. p. 11.
22	. .	Mr. Kinder Wood . .	. . .	. .	. . .	died	dead	Med.-Chir. Trans. vol. vii. p. 264.
23	1813	Dr. Wallis . . .	. . .	48 hours	tumour	died	saved	Med. Times and Gazette,

27	. .	Ditto	. . .	. .	distortion	died	lost	Pamphlet, 1849.
28	1821	Barlow and Dugdale .	Mrs. Ridgedale	. .	. . .	died	alive	Merriman, p. 317.
29	. .	Dr. Henderson, Perth .	Mrs. Lowe .	18 hours	distortion	died	alive	Ibid.
30	1826	Dr. Crichton . . .	. . .	6 days	distortion	died	saved	Ed. Jl. July, 1828, p. 53.
31	1829	Dr. M'Kibbin, Belfast .	. . .	. .	exostosis	died	dead	Ed. Jl. Nov. 1831, p. 352.
32	. .	Mr. Ward . . .	. . .	. .	. . .	died	dead	Lancet, Mar. 28, 1840.
33	1834	Dr. Montgomery, Dublin	. . .	. .	fib. tumour	died	dead	Dub. Jour. vol. vi. p. 418.
34	1841	Mr. Ross, Invergordon .	. . .	5 days	tumour	died	alive	Ed. Monthly Jl. 1842.
35	1843	Drs. Cyrus Falconer & Goodman . .	. . .	. .	. . .	died	saved	Amer. Jl. N. S. vol. vi. p. 264.
36	. .	Dr. Radford . . .	Betty Wilcock	60 hours	distortion	died	twins saved	Assoc. Jl. Jan. 19, 1856.
37	1843	Dr. Elliott, Waterford .	. . .	. .	distortion	died	dead	Letter to the Author.
38	. .	Mr. Whitehead, Manchester	. . .	. .	. . .	doubtl.	alive	Ranking, vol. vii. p. 330.
39	. .	Mr. Braid . . .	. . .	. .	. . .	dead	dead	
40	. .	Messrs. Bailey and Hardy	. . .	. .	. . .	dead	dead	
41	1845	Mr. Lyon, Glasgow . .	. . .	. .	tumour	dead	saved	Ed. Mon. Jl. Dec. 1845.
42	1847	Mr. Skey, London . .	. . .	. .	distortion	died	dead	Ranking, vol. v. p. 293.
43	1848	Dr. Merriman . . .	. . .	. .	. . .	died	saved	
44	1848	Dr. Shipman, U.S. . .	. . .	48 hours	tumour	died	dead	Amer. Med. Jl. July, 1849.
45	1848	Dr. Sannerman . .	. . .	12 hours	distortion	died	dead	Lancet, July 13, 1850.
46	. .	Dr. West, London . .	E. Williams .	14 hours	distortion	died	saved	Med. Times, Feb. 22, 1851.
47	1849	Mr. Campbell, Lisburn .	. . .	. .	distortion	died	saved	Ranking, vol. x. p. 330.
48	1850	Mr. Nimmo, Dundee .	. . .	17 hours	distortion	died	saved	Ed. Mon. Jl. Sept. 1850.
49	1850	Dr. Oldham, London .	. . .	17 hours	distortion	died	dead	Med. Times, Feb. 22, 1851.
50	1851	Dr. Shipman . . .	. . .	. .	tumour	died	dead	Amer. Jl. vol. xviii. p. 122.
51	1853	Dr. Waller . . .	. . .	. .	fib. tumour	died	saved	Med. Times and Gaz. vol. xxvii. p. 266.
52	1854	Sir James Simpson .	. . .	. .	moll. ossium	died	dead	Brit. Med. Jl. 1854, p. 1066.
53	1856	Mr. Humphrey . .	. . .	. .	moll. ossium	died	dead	Do. 1856, p. 779.
54	1856	Dr. Clay	. . .	. .	tumour	died	dead	
55	1858	Mr. Murphy . . .	. . .	. .	tumour	died	dead	Dub. Jl. No. 6, 1859.
56	1858	Dr. R. Greenhalgh . .	. . .	. .	distortion	died	saved	Med. Ts. & Gaz. May, 1858.
57	. .	Drs. Douglass & Vanvalsah	. . .	. .	distortion	died	dead	Amer. Med. Journal.

II. SUCCESSFUL CASES.

No.	Date.	Operator, or Authority.	Patient's Name.	Hours in Labour.	Cause.	Results to Mother.	Results to Child.	References.
1	1739	Mary Dunally, Midwife .	Alice O'Neal .	12 days	. . .	rec.	dead	Ed. Med. Essays, vol. v. pt. 1, p. 439.
2	1793	Mr. Barlow . . .	Jane Foster .	5 days	distortion	rec.	dead	Med. Rec. & Res. p. 154.
3	1822	Mr. Cellen, New York .	. . .	. .	distortion	rec.	saved	N. York Jl. Mar. 1823.
4	1827	Dr. Richmond, Ohio, Amer.	. . .	. .	. . .	rec.	saved	Western Med. Jl. Nov. 1827.
5	1827	Mr. Knowles, Manchester	. . .	. .	. . .	rec.	. .	Trans. of Prov. Ass. vol. iv.
6	1833	Mr. Greaves, Rockingham	. . .	. .	distortion	rec.	saved	Lancet, 1833–4, p. 148.
7	1835	Mr. Gibson, N. York, Amer.	. . .	. .	. . .	rec.	saved	Amer. Jl. of Med. Science, May, 1835.
8	1837	Ditto and Fox . .	. . .	5 days	. . .	rec.	saved	
9	. .	Dr. Fox	. . .	. .	. . .	rec.	saved	Lancet, Mar. 28, 1840.
10	. .	Dr. Wright . . .	. . .	. .	. . .	rec.	saved	Ditto, 1833–4, p. 148.
11	1845	Mr. Goodman, Manchester	Mrs. Sankey .	5 days	. . .	rec.	saved	Ranking, vol. vii. p. 239.
12	1847	Dr. Henderson, U.S. .	. . .	. .	. . .	rec.	putrid	Ranking, vol. v. p. 293.
13	1849	Dr. Radford . . .	Mrs. Haigh .	3 days	. . .	rec.	saved	Prov. Med. & Surg. Jl. Aug. 22, 1849.
14	. .	Ditto	. . .	. .	. . .	rec.	saved	Ranking, vol. x. p. 212.
15	1850	Dr. Coltman . . .	. . .	. .	exostosis	rec.	saved	N. Orleans Med. and Sur. Journal, Nov. 1850.
16	1841	Dr. Travis, Tenn. .	. . .	. .	. . .	rec.	saved	Med. Exam. Sept. 1850.
17	. .	Dr. Jeter, Georgia . .	. . .	. .	. . .	rec.	dead	Southern Med. and Sur. Journal, March, 1851.
18	1856	Dr. Thornton, Dewsbury .	Anne N—— .	. .	dis. of sacrum	rec.	dead	Lancet, March 28, 1857.
19	1858	Mr. James Hawkins .	Mat. Tanner .	2 days	distortion	rec.	saved	Med. Times and Gazette, May 8th, 1858.
20	1851	Dr. Oldham . . .	. . .	. .	scirrhus	rec.	saved	Lancet, vol. ii. p. 226, 1851.
					. .	rec.	dead	Amer. Jl. N.S. vol. xii. p. 386.

Thus, in British and American practice, out of 80 cases, 23 mothers were saved and 57 lost, or more than two-thirds.

Out of 77 cases where the result to the child is mentioned, 44 were saved and 33 lost, or nearly one-half. Dr. Radford, in his able essay on this subject, has tabulated 76 cases operated upon in Great Britain; of these, 66 or 85·71 per cent. died, and 11 or 14·28 per cent. recovered. Of the 78 children, 46 were saved and 32 died.*

In addition, I have collected from foreign authorities 371 cases, out of which 217 mothers recovered and 154 died, or about 1 in $2\frac{1}{3}$.† Out of 189 of these cases where the result to the child is given, 139 were saved and 50 lost, or nearly one-fourth. Taking the entire number, which amounts to 450, we find that 330 mothers were saved and 210 lost, or about 1 in 2; and that out of 315 children, 211 were saved and 104 lost, or about 1 in $3\frac{1}{3}$. M. Figuiera collected 790 cases, of which 424, or more than one-half) were fatal to the mothers.

Dr. West has collected 409 cases, of which 251 (considerably more than one-half) proved fatal to the mother; 237 children were saved.

Dr. Arneth mentions that Kayser has collected and analysed 338 cases, of which number 210, more than half, proved fatal to the mother; 86 of the children were either dead born or perished soon after birth.

In Nassau, Dr. Ricker says, that in 311,409 cases, there were 12 cases of Cæsarian section, 2 mothers and 7 children were saved.

Dr. Winckel performed the operation 13 times himself, and assisted in two other cases: 8 mothers died, 7 recovered; of the children, 8 were born alive and 7 dead. One patient underwent the operation and died, another three times, and recovered.‡

M. Duffeillay has collected the cases operated on since 1858, and the result is said to be about 75 per cent. of recoveries.§

Further: on a good number of these patients the operation has been performed more than once; on some, three and four times. And if we credit the older writers we find five, six, and seven times with success.

This is shown in the following table:—

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* On Cæsarian Section, p. 7.

† I do not mean that so many mothers were saved from death by the operation, but that they were saved from the effects of the operation. No doubt, many were really saved from death, which could not have been otherwise avoided; but we have proof that many could have been delivered by other means, inasmuch as they afterwards bore children naturally.

‡ Year-book, 1862, p. 382.

§ Ed. Med. Journal, Sept. 1864, p. 227.

No.	Date.	Operator, or Authority.	Patient or Place.	Number of Operations.	No. of Children saved.	Result to Mothers.
1	......	—Guillet	... ...	6 times	6	saved.
2	......	Le Noir and Lebrun	... ...	3 times	3	recovered.
3	......	M. Jobert	... ...	twice	1	do.
4	......	M. Peyronnie	... ...	twice	...	do.
5	......	M. Sommins	his own wife	7 times	...	do.
6	......	A Surgeon at Paris	his own wife	5 times	...	do.
7	......	... ...	... ...	3 times	...	do.
8	......	... ...	at Aucois	6 times	...	do.
9	......	Count Nessan	... ...	7 times	...	do.
10	1775-9	M. Lambron	... ...	twice	...	do.
11	1797	Mangold and L. Mautz	... ...	3 times	...	recovd. twice—died after 3rd.
12	1801					
13	1805					
14	1797 1806	M. Bacqua	—Gabery	twice	...	recovered.
15	1796	Rhode and Sommer	... ...	twice	...	do.
16	1810					
17	1802	Lorinzer	—Groger	twice	...	do.
18	1805					
19	1805 7-14	M. le Maistre, d'Aix	—Fauvo	3 times	...	do. d. after 3rd
20	1813, '15	Dr. Charmeil	... ...	twice	...	recovered.
21	1817 1819	M. Locher	... ...	twice	...	recovd. once—died 2nd time.
22	1821, '26	M. Merrin	—Viandes	twice	...	recovered.
23	1823	M. Bosch	... ...	twice	...	do.
24	1823, '25	M. Schenck	... ...	twice	...	do.
25	1805, '07	M. Daristo	Martinique	twice	...	do.
26	1826, 30, 32, 39	M. Michaelis	—Adawetz	4 times	...	do.
27	......	Dr. Zwancke	... ...	...	...	...
28	......	Weidmann Michaelis	... ...	4 times	...	recovered.
29	do.	do.	... ...	...	...	...
30	......	Dr. Boowin	... ...	twice	...	do.
31	......	M. Gardey	... ...	twice	...	do.
32	1825 1826	Dr. Schmidt	... ...	twice	...	recovd. once—died 2nd time.
33	1824 1826	Dr. Engeltrum	Amsterdam	twice	2 saved	recovd. once—died 2nd time.
34	1833, '35	Dr. Bouvin	... ...	twice	...	recovered.
35	1832, '38	Dr. Kilian	... ...	twice	...	do.
36	1837 1843	do.	... ...	do.	...	do.
37	1840 1844	Dr. Mestenhausen	... ...	do.	...	do.
38	1846	Drs. Bach & Stolz	... ...	do.	...	do.
39	......	Dr. Wieckel	... ...	thrice	...	do.

M. Stolz has also published a case in which he performed the operation twice with success.* Sir James Simpson mentions that, when he visited Bonn, he saw a woman upon whom Kilian had operated three times successfully, and who was looking forward to a fourth operation,† which my friend, Professor Retzius, of Stockholm, informs me has since been successfully performed. Dr. Decoen has recently performed hysterotomy in a case of ruptured uterus, for the purpose of removing the children (there were twins) from a woman on whom he had formerly performed Cæsarian section. She recovered the more recent as well as the former operation.‡

After a careful examination of the cases on record, it appears that a certain amount of success has attended the operation, and that modern improvements have rather increased the number of recoveries; so that I think we may fairly conclude, that as so many women have recovered from the operation, *it does afford a chance to both mother and child, and that therefore we may be justified in having recourse to it; but that, as the danger is much greater than from any other operation, we should not be warranted in performing it, if there were a prospect of success by other means.*

This, then, constitutes the sole *advantage* of the operation, that in *cases where we cannot deliver the patient with safety by any other means, and when, consequently, both mother and child would inevitably die, we may afford each a chance by performing the Cæsarian section.*

It has no *comparative* advantages, being itself the ultimate standard by which the other operations are to be estimated, and which are valuable, inasmuch as they afford a means of escape from this more formidable one. In this point of view I must not omit noticing one which, although not available in any case to which we are called at the time of labour, may prevent the necessity of a second operation. I allude to the artificial induction of premature labour, or of abortion. Whenever the diameters of the pelvis are so reduced as to render the extraction of a mutilated fœtus impossible, or even hazardous, I conceive that it would be grievous neglect of duty not to propose this alternative; nay, more, I really think we have a right to insist upon it; for surely, it can hardly be expected that a conscientious medical man will consent to destroy child after child, or to subject mother and child to the fearful risk of the Cæsarian section when a means of avoiding it is in his power. It is true that by this operation the child may be lost, but the mother will, in all probability, be saved; and the bare chance of saving the child by Cæsarian section can never compensate for the additional risk to the mother.

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* Med. Circular, Aug. 22, 1855, p. 89; Ed. Med. Journal, Aug. 1855, p. 179.

† Edin. Monthly Journal, July, 1850.

‡ Med. Times and Gaz., May 21, 1853, p. 530.

The *disadvantages* of the operation will be easily gathered from what has been said; they are mainly, the great risk of hæmorrhage or of fatal peritonitis to the mother, and the small chance afforded to the child; these constitute the *objections* to the operations.

That these are very serious objections cannot be denied, nor that they would be insurmountable, had we any other mode of delivery. But when we consider that the only choice is between this operation, which does afford some chance, and certain death to both mother and child, we cannot, I think, hesitate about running the risk. Doubtless, however, the dangers of the operation should make us pause, and carefully examine the facts of the case, with the aid of the experience of others, before we decide upon this proceeding. In the present day it would be an indelible disgrace to an accoucheur, that his patient, after recovering from the Cæsarian operation, should bear children without assistance.

The *cases suitable for the operation* are not very numerous.

1. When the pelvis is so distorted from any cause that the diameter of the upper or lower outlet is reduced to an inch and a half or two inches, it may be considered impossible to extract a mutilated fœtus; or, if possible, it must be with so much force as to entail the death of the mother. The operation is equally necessary under these circumstances, whether the child be alive or dead, and it may also be required (in consequence of mollities ossium) after several children have been born naturally.

2. Morbid growths from the periosteum, which offer a fixed and permanent and increasing obstacle, may so much reduce the calibre of the passage as to render this operation necessary. This was the case with the patients of Dr. Montgomery and Dr. Shekleton. But before we decide upon the necessity for this mode of delivery, we must be quite sure that the obstacle can neither be displaced nor reduced in volume; and this can seldom be determined until labour commences. On the other hand, we must remember that all tumours increase, *however slowly*, and that, therefore, the patient having been delivered "*per vias naturales*" in one labour, is no proof that she may be in the next.

3. In some cases of ruptured uterus, when delivery is imperative, but impossible "*per vias naturales*," Cæsarian section has been recommended. It appears to me that the additional risk from the operation renders its propriety very questionable.

4. The operation has been performed successfully in cases of extra-uterine fœtation, where the continued presence of the fœtus in the abdominal cavity threatened the mother's life.

5. In case of the sudden death of the mother, Cæsarian section may be performed for the purpose of saving the infant. Successful cases are on record; and one recently by Mr. Harlay, in Edinburgh.* Of course the operation will be useless, unless the woman have arrived at that period of pregnancy when the child is "viable." It will also be in vain if much time have elapsed after the death of the mother. Dr. Jackson, however, recovered an infant half an hour after the death of the mother.

6. If, towards the end of pregnancy, the uterus be wounded extensively, Dr. Hull considers the Cæsarian section necessary.

7. Authors have mentioned other cases to which the operation was applicable, as in occlusion of the vagina, scirrhus uteri, &c. But these hardly appear to me adequate grounds for so serious an operation.

The best *period for the performance* of the operation appears to be at the commencement of labour, provided there be no doubt of its necessity. The strength of the woman is then unimpaired, and she can not only support the operation better, but has greater prospect of escaping subsequent inflammation. It is supposed, and I think not without foundation, that the ill success which has attended the operation in this country is partly owing to the late period at which it has been undertaken.

In Mr. Thompson's case, it was performed 24 hours after the commencement of labour; in Dr. Cooper's, 12 hours; in Mr. Chambers' case the labour had lasted 12 days; in Dr. Hamilton's, more than 2 days; in Mr. King's, more than 3 days; in Mr. Atkinson's, nearly 3 days; in one of Dr. Hull's (Isabella Redman), 12 hours; in the other (Ann Lee), 10 days; in the case of Mary Donally, 12 days; in Mr. Barlow's case, 5 days. Dr. Hull proposes to operate as soon as the os uteri is dilated, and before the membranes burst. De Graaf advises the operation to be performed just after the rupture of the membranes, and the commencement of the expulsive pain.

METHOD OF OPERATING.—Having determined upon the necessity, and the proper period for the operation, the next subject for consideration is the best mode of performing it. Very little alteration has taken place in this respect since the earlier writers.

The bowels and bladder are to be evacuated, and the patient placed on her back, upon a table covered by a mattress. Her fortitude must decide upon the necessity for restraint, and its amount, if chloroform be not used.

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* Edin. Monthly Journal, July, 1850.

Before commencing the operation it will be proper to ascertain (by the stethoscope) the situation of the placenta, or, at least, that it be not in front. The incision through the integuments must then be made, either vertically, through the linea alba—obliquely, on the outside of the rectus muscle—between that muscle and the spine—or horizontally, beneath the umbilicus. The latter is the best if the patient be deformed. It should be about eight or ten inches in length, and when vertical, it may be commenced a little above the umbilicus, and terminate near the pubes. This incision should divide the parietes of the abdomen down to the peritoneum, which is then to be cautiously punctured, and a director, or the finger, inserted into the wound, so as to avoid injuring the intestines, and the peritoneum divided. The uterus will now be exposed, and an incision must be made into, but not through, its parietes, of the same length as that through the abdominal parietes. This incision must be cautiously deepened, until the membranes are exposed. A slight opening must then be made in them, and some of the liquor amnii removed, by small pieces of sponge. It has occurred to me that this might most readily be effected by a syringe. The object in view is to prevent effusion into the abdominal cavity. By Lauverjat and others we are recommended to rupture the membranes previously. The opening is then to be enlarged, and the infant withdrawn, the funis tied, and the placenta and membranes removed.

The remaining liquor amnii, with any blood which may have escaped, must be removed from the cavity of the uterus, and the operator should make sure that the os uteri is pervious for the escape of the lochia. No sutures are required in the uterus: as it contracts, the wound will be reduced to about 1½ to 2 inches in length, and the lips will come into apposition, if it be healthy. It is only in cases where they do not do so that there is anything to fear from hæmorrhage. When the uterus is diseased, the wound does not close perfectly, and, of course, union cannot take place without sutures.

The abdominal cavity is next to be lightly sponged, to remove any blood which may have escaped, and then, the intestines being retained "*in situ*" by an assistant, the lips of the external wound are to be closed by so many sutures of silver or iron wire as may be necessary. Dr. Monro, of Edinburgh, advised "that in performing the Cæsarian operation, we should be careful that the viscera be exposed as little as possible; and that the sides of the wound should be kept contiguous by a greater number of stitches than are commonly employed in wounds, in order to exclude the air from the cavity of the abdomen." In addition to the sutures, straps of adhesive plaster may be applied, and over all I would suggest Dr. Macartney's water-dressing. The patient must then be placed in bed, and the utmost quiet observed. Stimulants will probably be necessary during and after the operation; and when the patient is settled in bed, an opiate may be given.

As a variation from this mode of operating, I may mention Dr. Aitken's suggestion of performing it "while the parts are immersed in tepid water, so as to exclude the air," and so, perhaps, diminish its fatal effects. I do not know that this plan has ever been tried.

M. Roubaix, in an elaborate essay on this subject, lays down the following objects at which we are to aim in performing the operation: 1, to prevent the entrance of air into the peritoneal cavity and uterine sinuses; 2, to prevent the effusion of blood and liquor amnii; 3, to make the incisions in such a manner that union by first intention may be encouraged as far as possible; 4, to take precautions against inflammation of neighbouring tissues; 5, to perform the operation at a favourable time.*

The *difficulties* of the operation are not great. With a little care, we may avoid that part of the uterus to which the placenta is attached, and which is the most vascular, as the stethoscope, previously applied, will indicate whether it is situated anteriorly or not. Caution will also avoid wounding the child when dividing the uterus.

In approximating the lips of the external wound, the intestines are sometimes troublesome, and it is of importance not to include any, as that would add the dangers of strangulated hernia to the unavoidable risk of the operation.

The principal *dangers* of the operation are—

1. Hæmorrhage, from the incomplete closure of the wound in the uterus.

2. Strangulation of a loop of the intestines, either in the wound of the uterus, or in the external wound, although due attention will avoid this danger altogether.

3. Subsequent inflammation of the uterus and peritoneum.

The patient may die of the shock within a few hours, or her strength may be exhausted by hæmorrhage into the abdominal cavity; but if she survive for a day or two, her death will then probably be owing to inflammation.

Subsequent treatment.—The most incessant care and attention will be required. The water-dressing should be continued, and it may be as well to administer small doses of calomel and opium. On the first appearance of inflammation at the edges of the wound, leeches should be applied along it, and if there be tenderness, a considerable number should be applied over the abdomen, and repeated if necessary, and the doses of calomel and opium increased.

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* Prov. Med. and Surg. Journ., Oct. 30, 1850, from Encyclographie for June, 1850.

CHAPTER XV.

OBSTETRIC OPERATIONS. 7. SYMPHYSEOTOMY.

But one more operation remains for consideration, and I should have omitted it altogether, had I not felt it as much a duty to point out its inapplicability, as the suitability of the others to the cases for which they were intended. I do not for a moment wish to undervalue the humanity which desired to substitute a minor operation for one so formidable as the Cæsarian section. But when the results of experience support the opinion of the wisest and best midwifery authors, it would be a criminal neglect did I not adduce the objections to this operation in their strongest form.

First, however, it may be interesting to give a sketch of its history.

M. Sigault, while yet a student, being impressed with the fatal results of the Cæsarian section, conceived that it might be altogether avoided by an artificial separation of the ossa pubis. This notion was based upon the assumed fact, that this joint spontaneously separates in difficult labours. This had been asserted over and over again by the older writers, and upon this assumption Sigault based his experiments upon the dead body. In the year 1768, he presented a memoir to the Faculté de Médecine on the subject, proposing that the operation should be tried at first upon animals, and then upon condemned criminals. The memoir was referred to M. Ruffel, who reported unfavourably, and the subject was dropped. However, M. Sigault was not discouraged: he again proposed it in his Thesis, on taking his degree at Angers, and in Paris, on seeking for his licence; and as the proposal was communicated to others, and favourably received, it excited a good deal of interest.

In M. Alphonse Le Roi, Sigault met with an able second, and they determined to give the operation a fair trial the first opportunity. This occurred on the 1st October, 1777, in the case of —— Souchel, who had previously been delivered by craniotomy.

She was safely delivered by the new operation, and a report was immediately made to the Faculté de Médecine, who were requested to appoint a commission to superintend the patient's recovery. MM. Grandclas and Descemet were appointed to this office, and notwithstanding that the bladder was injured, and the mother barely escaped with life, such was the enthusiasm excited in the Faculté de Médecine by their report, that they lost sight of the calm investigation becoming a learned body, and on the strength of one case—and that not a very satisfactory one—voted medals to MM. Sigault and Le Roi, and procured a pension for the former and for his patient.

The inscription upon the medal was:—

A. 1768. Sectionem Symphyseos Ossium
Pubis. Invenit. Proposuit.
A. 1777.
Fecit feliciter
M. Sigault, D.M.P.
Juvat M. Alphonsus Le Roi, D.M.P.

Persons were not wanting to applaud the inventor and his operation, which was characterized as "the result of inspiration," and several practitioners in France and Germany followed his example.

M. Sigault himself operated on four other women, one of whom died, and several of the children. He seems, indeed, to have become less confident in its safety and efficacy; for he refused to perform it unless there was a space of 2½ inches in the short diameter; and before his death, in such a case, he recommended the Cæsarian section. "It was soon found, however, not to merit the high encomiums bestowed upon it. *Every operation was found to have its victim,* although it was several times performed upon women whose pelves were either not at all, or very slightly, deformed, and who, either before or after the operation, were delivered without any extraordinary assistance—a convincing proof that the operation had been, in these cases at least, unnecessarily resorted to."*

In 1778, he published a "Discours sur les Avantages de la Section du Symphyse du Pubis," in which he examines the usual means of assisting difficult labours, and concludes by stating his reasons for preferring Symphyseotomy to the Cæsarian section.

The first persons, I believe, who investigated the propriety and efficacy of the new operation in this country, were Dr. W. Hunter, Mr. Hunter and Dr. Denman. The former published the result of his inquiries in the *London Med. Obs. and Enquiries.* "The women of Great Britain," says Dr. Osborn, "are therefore under considerable obligations to the late Dr. Wm. Hunter, who, from an accurate mensuration of those pelves where the Cæsarian operation had actually been performed in this country, and of others still smaller, preserved in his museum, has demonstrated the futility of the section of the symphysis as a succedaneum for that operation, or as a certain means of preserving both the mother and child." He suggested a combination of the Sigaultian operation with craniotomy, as affording the mother a better chance than the Cæsarian section. But, as Dr. Osborn remarks, "Prof. Guerard's case is exactly in point, and confirms by experiment what was to be expected *à priori.* The child's head in that case was opened, after the division of the symphysis had been performed; but the professor was, notwithstanding, foiled in every attempt to deliver, both by the forceps and the crotchet; and the event in the end proved fatal to the mother." *

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* Hull's Second Letter, p. 94.

The next writer who notices the operation is Dr. Leake, who, in his work on the Diseases of Women, 1781, has a few pages upon this operation, of which he is inclined to judge favourably, though with caution. He answers some of the objections urged against it, but admits that more experience was required.

The operation was performed in the year 1782, for the first and last time in this kingdom, by Mr. Welchman, of Kington, in Warwickshire. The child was putrid, and the mother died; but Mr. Welchman thinks that her death was not caused by the operation.†

Dr. Osborn, in his Essays on Midwifery, 1783, gives a good historical sketch of the operation, and after a very careful examination into the merits of it, he arrives at the conclusion that "*no circumstances whatever, real or imaginary,* can ever render it a warrantable operation."

Mr. Dease, in his Observations in Midwifery, 1783, disapproves of the operation. He says, it was "of worse consequence than the Cæsarian; as it subjected the woman to all the dangers of the latter, without the same advantages of saving the child."

Dr. Hamilton, sen., in his Outlines of the Theory and Practice of Midwifery, 1784, doubts the efficacy of the operation, and points out its hazard.

Dr. Aitken, Elements of Midwifery, 1784, says that the

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* Essays in Midwifery, p. 282.

† London Med. Journal, 1790. Hull's First Letter, p. 138.

5. In these cases of distortion, after the head has been extracted piecemeal, we may find it impossible to bring away the body of the infant. We must then use the perforator, for the purpose of evacuating the contents of the chest and abdomen, and afterwards apply the crotchet to extract the child.

One or more of these modifications of the operation will be successful in all cases which come within the limits already described.

Statistics.—The positive *advantage* we obtain from embryotomy is the safety of a large proportion of the mothers, who, in addition to the children, must have perished had no aid been afforded. The children, of course, are all lost.

What the proportion of success is, I shall now endeavour to show; but previous to this I shall adduce whatever evidence we possess to ascertain the comparative frequency of the operation.

FREQUENCY OF THE OPERATION.

a. *Among British Practitioners.*

Date.	Authors.	Total No. of Cases.	No. of Crotchet Cases.	References.
1781	Dr. Bland . .	1,897	8	Merriman's Synop. p. 333.
1787 to 1793	Dr. Jos. Clarke .	10,387	49	Trans. of Assoc. vol. 1.
	Dr. Merriman .	2,946	9	Synopsis.
1818	Dr. Granville .	640	3	Report, p. 25.
1828, 1829	Dr. S. Cusack .	701	5	Dub. Hosp. Reports.
1832, 1833	Dr. Maunsell .	839	5	Ed. and Dub. Jour.
1829	Mr. Gregory . .	691	2	Dub. Hosp. Rep. vol. 5.
1826 to 1833	Dr. Collins . .	16,414	79	Practical Treatise.
1834	Dr. Thos. Beatty	1,182	3	Dub. Jour. vols. 8, 12.
	Mr. Lever . .	4,666	25	Guy's Hosp. Reports.
	Dr. Reid . . .	5,691	22	Ranking, vol. 4.
1836,37,38,39	Dr. Churchill .	1,640	11	Reports to June, 1840.
1838	Mr. Warrington	88	1	American Journal.
1829	Mr. Mantell . .	2,510	3	Do.
1848	Drs. M'Clintock and Hardy	6,634	52	Practical Obs. p. 95.
1820 to 1827	Dr. Ramsbotham	68,435	85	Obst. Med. & Surg. p. 720.
1842 to 1844	Dr. Murphy . .	467	2	Rep. of Univ. Col. Hosp.
	Dr. Storer . .	451	2	Amer. Jour. Oct. 1851.
	Dr. Adams . .	628	4	Ranking, vol. 4.
	Dr. Toogood . .	1,135	6	Prov. Jour. vol. 8, p. 103.
	Dr. Copeland .	1,290	2	Crosse's Med. p. 12.
	Dr. Pagan . .	8,684	15	Glasg. Jour. July, 1852.
1847 to 1854	Drs. Sinclair & Johnston	13,748	130	Pract. Mid. p. 224.
	Dr. Hall Davis .	13,783	15	On Difft. Parturit. p. 340.
	Dr. R. U. West .	2,083	6	Assoc. Jour. July, 1853.
185–	Mr. Harrisson .	1,000	7	Brit. Med. Jour.
	Dr. Cross . . .	4,733	3	
	Mr. Smart . .	5,026	14	Lancet, Oct. 13, 1860.
	Mr. Dunn . .	3,821	10	Obst. Tran. vol. i. p. 287.

b. *Among French Practitioners.*

Date.	Authors.	Total No. of Cases.	No. of Crotchet Cases.	References.
1797 to 1809	Madame Boivin .	20,517	16	Mémorial, p. 337.
1803 to 1811	Mad. Lachapelle	15,654	14	Prat. d'Accouch. p. 500.
1834 to 1843	Dr. de Belli . .	2,739	39	Ranking, vol. 4.

c. *Among German Practitioners.*

Date.	Authors.	Total No. of Cases.	No. of Crotchet Cases.	References.
1801 to 1807	M. Richter, Moscow .	2,571	3	Velpeau.
1811 to 1827	Moschner & Kursak, Prague . . .	12,329	4	Siebold's Jour. vol. 9.
1812	Dr. Siebold, Wurtzburg	170	1	Do. vol. 1.
1818 to 1829	Do. Berlin . .	97	1	Do. vol. 10.
1832	Do. Marburg .	155	1	Do. vol. 13.
1814 to 1827	Dr. Carus, Dresden .	2,908	9	Do. vol. 9.
1819	Dr. Ritgen, Giessen .	103	1	Do. vol. 6.
1825 to 1827	Dr. Kilian, Copenhagen	2,350	4	Velpeau.
1794 to 1804	Dr. Henne, Prague .	500	1	Siebold's Jour. vol. 2.
	Dr. Naegelè, Heidelberg	1,411	5	Velpeau.
	M. Boer, Vienna . .	39,390	84	Die Geburtsh. Praxis.
1821 to 1825	Dr. Riecke	219,303	51	Velpeau.
1825, 26, 27	Dr. Klugè, Berlin . .	809	8	Siebold's Jl. vols. 7, 9.
1825	Prof. Andrée, Breslau .	351	2	Do. vols. 7, 8.
1827	Dr. Küstner, Breslau .	176	2	Do. vol. 9.
1829	Dr. Adelmann, Fulda .	57	1	Do. vol. 11.
1797 to 1837	Dr. Jansen, Ghent . .	13,365	5	Med. Gazette, March 6, 1840.
1847 to 1849	Dr. Arneth, Vienna .	6,608	4	Die Geburtsh. Praxis, &c., p. 99.
	M. Klein	35,417	53	Ibid.
	M. Bartsch	4,425	3	Ibid.
1821 to 1842	Dr. Ricker	304,150	143	Med. Times and Gaz., Oct. 11, 1856.

Thus, among British practitioners, we have 563 crotchet cases in 173,625 cases of labour—or about 1 in 308½.

Among the French and Italians, 69 crotchet cases in 38,908—or 1 in 563¾.

And among the Germans, 386 crotchet cases in 646,645 labours—or 1 in 1675.

Added together, we have 859,178 cases, and 1018 in which the crotchet was used—or 1 in 844.

RESULTS OF THE OPERATION TO THE MOTHERS.

Authors.	No. of Crotchet Cases.	Mothers died.	Authors.	No. of Crotchet Cases.	Mothers died.
Dr. Smellie	44	4	Dr. Storer	2	1
Mr. Perfect	3	0	Dr. Beatty	3	0
Dr. Jos. Clarke	49	16	Dr. Churchill	11	1
Do., P.P.	12	8	Do., P.P.	20	0
Dr. Grauville	3	3	Mr. Warrington	1	0
Dr. Ramsbotham	34	5	Dr. Pagan	15	2
Dr. Maunsell	5	2	Dr. Hall Davis	15	1
Mr. Gregory	2	1	Dr. R. U. West	6	0
Dr. Collins	79	15	Mr. Harrisson	7	1
Dr. Lee, P.P.	80	4	Mr. Swift	14	3
Drs. M'Clintock and Hardy	52	8	Mr. Dunn	10	2
			Dr. Siehold	3	1
Dr. M'Clintock, P.P.	5	0	Dr. Ritgen	1	0
			Dr. Klugè	8	3
Dr. F. Ramsbotham	60	6	Dr. Andrée	2	1
Dr. Murphy	2	0	Dr. Küstner	2	0
Mr. Cross, P.P.	7	0	Dr. Adelmann	1	0
Drs. Sinclair and Johnston	130	26	Dr. Arneth	4	2
			Dr. Ricker	123	35

This table gives the mortality of 141 in 800—or about 1 in 5½.

At first sight, one would expect the mortality among the mothers to be less after the use of the crotchet than the forceps; although the result of these investigations shows the reverse to be the case, and Dr. M'Clintock, in a very interesting paper, brought forward evidence to show this to be really the case. The only explanation I can give is founded upon the natural unwillingness of every humane practitioner to destroy life—the consequence of which feeling is, the delay of the operation so long as there is a hope of evading it. This delay, however, is unfavourable to the mother, and when at length the operation is performed, although it may have been less severe than delivery by the forceps, yet her condition has rendered her much more susceptible of injury from it. If we separate the cases in the table which occurred in private or consultation practice, we find the mortality very much less. In consultation I have had recourse to craniotomy twenty times, and all the patients recovered; in four other cases I was called in when the mother was past hope; these I therefore omit. Dr. Robert Lee has recorded eighty cases of craniotomy from disproportion, without complication, and although he was not called to some until much time had elapsed, only four died. Dr. Hall Davis has given forty-four consultation cases, of whom three only died.* Dr. Joseph Clarke operated twelve times, and all the women recovered. Mr. Cross operated seven times, and all recovered. Dr. M'Clintock five times, and all recovered.

This gives a result of 161 cases and 7 deaths, or 1 in 23.

The *comparative* advantages of the operation are very decided. In the cases we have supposed, the forceps is useless, and the natural powers inefficient; if, therefore, embryotomy were rejected as inadequate, the only *alternative* would be the Cæsarian section, the mortality of which is much greater, for 1 in $2\frac{1}{3}$ of the mothers are lost, and 1 in $3\frac{1}{2}$ of the children.

It would, however, be a serious omission if I did not notice another *alternative* operation, which, although not available after labour has commenced, may supersede the necessity for embryotomy in subsequent pregnancies: I allude to the induction of premature labour. In all cases where pelvic distortion renders craniotomy necessary at the full time, it becomes our duty to recommend the induction of premature labour in subsequent pregnancies, at such a period as shall, if possible, afford a chance of life to the child, or at least save the mother from a severer operation, and not merely to recommend, but to *insist* upon it. No woman has a right to require us to destroy successive children, when an operation like this can supersede craniotomy. The mortality among the mothers is very small, and more than half the children are saved.

So much for the positive and comparative advantages of the operation. I am not aware that there can be any just *objections* against it, in suitable cases; but undoubtedly there are most weighty objections against employing it without careful consideration and consultation. In fact, it ought to be deeply impressed upon every practitioner, that he who destroys the child, without due evidence that it cannot be saved, and that this is his only resource for saving the mother, is guilty of murder.

But it may be asked, when the responsibility is so serious, what evidence will be sufficient to satisfy a conscientious practitioner that he may not be committing a crime in his anxious endeavour to afford relief? To this it may be answered:

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* Parturition and its Difficulties, p. 241.

1. That the continuance of strong labour pains for a certain time, without any advance of the head of the child, is so far evidence of a fixed obstacle to the passage of the child.

2. The failure of a cautious attempt to introduce the forceps will, to a certain extent, demonstrate the amount of the disproportion between the head and the pelvis; and the failure of a careful yet firm attempt at extraction by the forceps (when the application has been effected), will prove that the disproportion cannot be remedied by compression.

3. A well-educated finger will enable us in most cases to ascertain whether the diameters of the pelvis are such as will allow of the passage of a living child. And even though this mode be uncertain, we have a means of correcting our estimate, by comparison with the child's head, in apposition with the pelvis. If the natural efforts after several hours, or the forceps with a proper and safe amount of compression and force, cannot bring the widest part of the head of the child through the narrow part of the pelvis, we may fairly conclude that the only resource is craniotomy.

4. The general condition of the mother will also aid our decision. If she be much exhausted, if fever be present, the uterus powerless, the life of the child doubtful, and the success of the forceps dubious, we may shrink from inflicting the double shock of an unsuccessful application of the forceps, and subsequent delivery by the crotchet. But these cases are very rare; they only happen when the patient has been mismanaged, and it requires experience and judgment to decide upon the propriety of terminating them by embryotomy.

A careful consideration of these circumstances will, I think, enable us to arrive at a correct conclusion in an individual case; and as the responsibility incurred in the destruction of the infant may lead to timidity, it should also be remembered that hesitation to act when the case is clear, involves a more fearful responsibility, by compromising the life of the mother.

The *cases* in which the operation is demanded are those in which the child is dead, or in which the character of the labour will involve its death, or in which it cannot be delivered alive by any means compatible with the safety of the mother. The limits of the operation are rightly restricted on the one hand by the extended use of the forceps, the induction of premature labour, and in certain cases by version; and on the other hand, by the employment of the Cæsarian section. Within these limits, the cases suitable occur—

1. When the child is dead and the labour tedious. But we must be quite sure that the child *be* dead, before this is made the ground of interference. If the head be putrid, and there is space in the pelvis, it is perhaps better to use the forceps, as the bones and integuments of the skull give way so easily under the crotchet, that it is sometimes very difficult to extract the child. I have seen the operation prolonged two hours from this cause alone.

2. In some cases of convulsions, rupture of the uterus, &c., where immediate delivery is necessary, *and where the forceps cannot be applied*, craniotomy must be performed.

3. In flooding cases, before the head has passed through the os uteri, if the cervix be dilatable, the child may be thus delivered; and this is peculiarly desirable when the flooding is large and the child premature. Of course it cannot be attempted when the placenta covers the os uteri, nor must we have recourse to it unless the woman is endangered by the hæmorrhage. In these two latter classes of cases, the child dies in most cases before we could possibly deliver it by any other means.

4. In distortion of the pelvis, when the antero-posterior diameter of the brim is less than three inches, we have no chance of delivery by the natural efforts or by the forceps; so that to save the mother we must destroy the child.

5. When the transverse diameter of the lower outlet is diminished to the same extent by the approximation of the tubera ischii, if the forceps applied antero-posteriorly are insufficient to move the head, we must have recourse to craniotomy.

6. When the calibre of the pelvis is diminished to a certain degree by a fixed obstacle—as, for example, a fibrous tumour, or an exostosis growing from the bone or periosteum, it may not be possible for the natural efforts alone, or aided by the forceps, to expel the child. In such cases it will be necessary to lessen the head and apply the crotchet. In these three latter class of cases, the passage through the pelvis may be so much diminished as to render it necessary to break up the skull, or to eviscerate the child.

7. In some cases of ovarian disease, where the tumour has formed adhesions within the pelvis, so as to prevent its being pushed above the brim, it has been found necessary to lessen the head, before the child could be extracted. We are not, however, to decide upon this measure until the natural powers have had a fair trial, as it sometimes happens, that in the progress of labour the tumour is so much displaced as to allow of the passage of the child. Further, before sacrificing the infant, we ought to ascer-

tain whether the contents of the tumour may not be drawn off, by passing a long trocar into it. If a small quantity of fluid escape, it may allow of the application of the forceps, and so enable us to save the child. If, however, the tumour prove to be solid and immovable, we must, as a "*dernier ressort*," have recourse to the perforator and crotchet.

8. When the child is hydrocephalic to such an extent as to prevent its entering or passing through the pelvis, whether distorted or of the natural size, there can be no question of the propriety of opening the head.

9. If an arm descend along with the head, the diameters of which correspond closely to those of the pelvis (whether the latter be of the usual size or not), it may be necessary to terminate the labour by opening the head.

10. I have already alluded to a class of cases, where, from mismanagement, the patient has been allowed to continue too long without help, and in consequence is greatly exhausted, with fever, quick pulse, delirium, &c. In such cases the patient will soon die if she be not assisted; and from the unfavourable state in which she is, she cannot bear a prolonged or very painful operation. Now if there be sufficient space for the forceps, they ought to be preferred, and it would be very wrong to use the perforator; but if this be doubtful, and the probabilities against our succeeding with that instrument, then the consideration of the patient's inability to bear a severe operation may in some cases decide us in favour of embryotomy. These cases, however, are but few, and they must be well marked, to justify our adopting at once such extreme measures.

11. In footling or breech cases, when the head (separated or not from the body) cannot be extracted, we must evacuate its contents.

The next question to be decided is the *period of labour* at which the operation should be performed.

1. In all cases where the diminution of the pelvic diameters is so great as to render it impossible that a living child can be born naturally or extracted, there can be no hesitation in recommending that the head should be opened at an early period of the labour, say, as soon as the os uteri is dilated or fully dilatable. By this means we shall afford a chance of the completion of the labour by the natural powers, as there can be no objection to waiting a few hours before extracting the child.

2. When the distortion is less, we cannot be sure as to the result of the natural efforts, and we must wait until it is evident that they are inadequate; then an endeavour should be made to

use the forceps, and if this fail, there should be no delay in the performance of embryotomy.

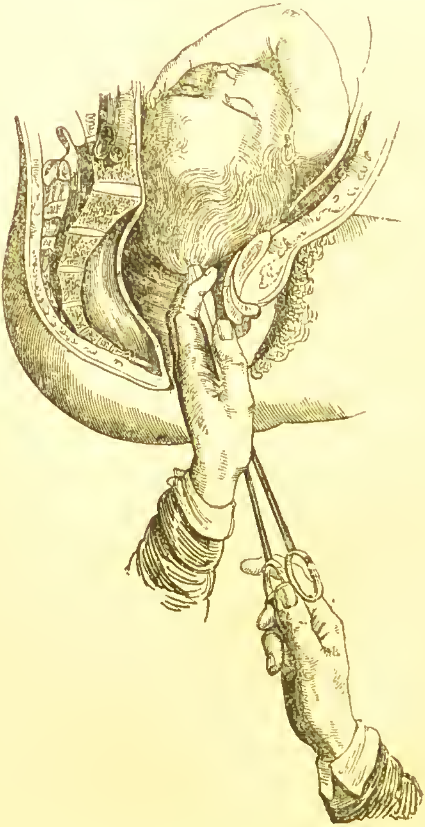
3. These observations will apply equally to the case of morbid growths, ovarian disease, &c., obstructing the passages.

4. In cases of convulsions, ruptured uterus, &c., the time for the operation is determined by circumstances connected with those accidents, and which will be found laid down in the chapters on the subject.

5. In cases where the child is dead, there need be no delay in performing craniotomy as soon as the delay in the labour renders it desirable.

Mode of operating.—It is not absolutely necessary for the

Fig. 99.



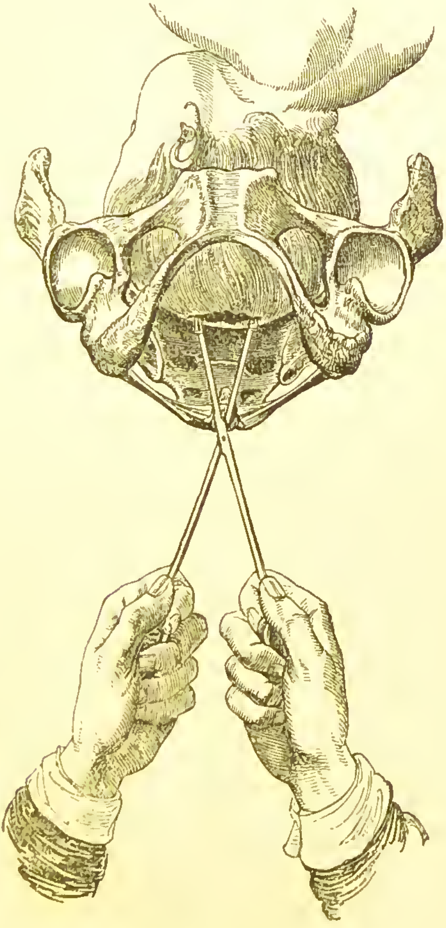
(*From Dr. Ramsbotham.*)

operation that the os uteri should be fully dilated, though it is a great advantage, and greater care will be required when this dilatation has not taken place.

The rectum and bladder are first to be evacuated; the patient is then to be placed on her left side, with the hips over the edge of the bed, and an assistant beside her, to fix and steady the abdomen.

One or two fingers of the left hand are then to be introduced

Fig. 100.



(*From Maygrier.*)

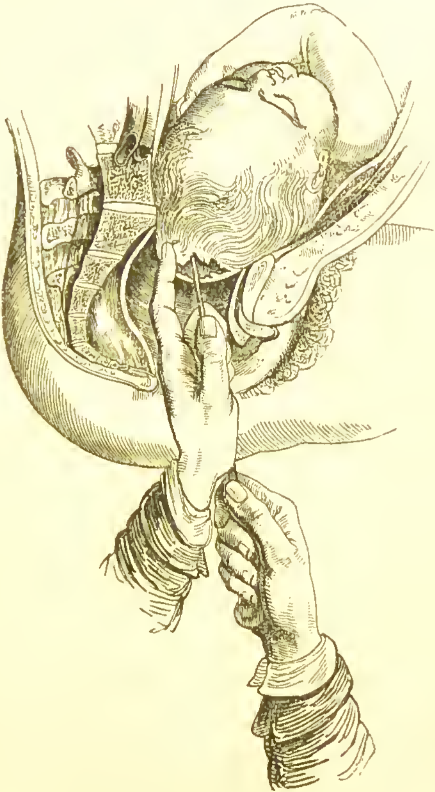
into the vagina, and their extremities fixed upon that part of the head of the child which is to be perforated. Contrary to ancient practice, this should never be the sutures, because after the opening is made in that situation, the bones collapse and close it. Having determined upon the situation, the perforator is to be passed along close to the palm of the hand and the inside of the fingers, so as to avoid injury to the soft parts of the mother.

Having arrived at the point of insertion into the skull, guided and guarded by the fingers of the operator, the perforator is to be pressed firmly forwards with a semi-rotatory motion, until it pierce the bone (fig. 99); it is then to be passed in up to the shoulders, and the handles are to be separated by an assistant as widely as possible (fig. 100). The cutting edges of the scissors are then to be placed at right angles with the first incision, and again separated, so as to make a crucial incision. This being effected, the perforator is to be passed into the skull, the brain thoroughly broken up, and the medulla oblongata cut across. The scissors are then to be withdrawn, and the first part of the operation is complete.

The left hand is again to be introduced, as a guide and guard to the crotchet, which should be passed into the cranium for the purpose of completely breaking up the brain. When this object is attained, if we wish to terminate the operation at once, the crotchet may be fixed on the outside or inside of the head; the former was adopted by the older practitioners, but the latter is recommended generally at present (fig. 101). In some cases it is useful to employ two crotchets—one internally and the other externally. The scalp should be carefully folded over the edges of the bones, in order to prevent injury to the passages, and then extracting force must be gradually and steadily applied during the pains, or at intervals, in imitation of them, in the axis of the outlet through which the head is passing: the left hand remaining in the vagina, and two fingers, being placed on the head, opposite to the insertion of the crotchet, for the purpose of steadying it and of preventing mischief, if the instrument should slip. If the part of the skull in which the crotchet is fixed give way, we must obtain another purchase. The amount of force, and its continuance, will depend of course upon the resistance to the passage of the child; but if, after a certain time, no progress be made, in order to avoid contusion of the soft parts of the mother, it will be well to break up the skull with the forceps adapted for that purpose. The perineum must be carefully guarded, and care must be taken that no injury be inflicted by the spiculæ of bone.

After the head is extracted, the body generally follows without much difficulty; but should this not be the case, we must have

Fig. 101.

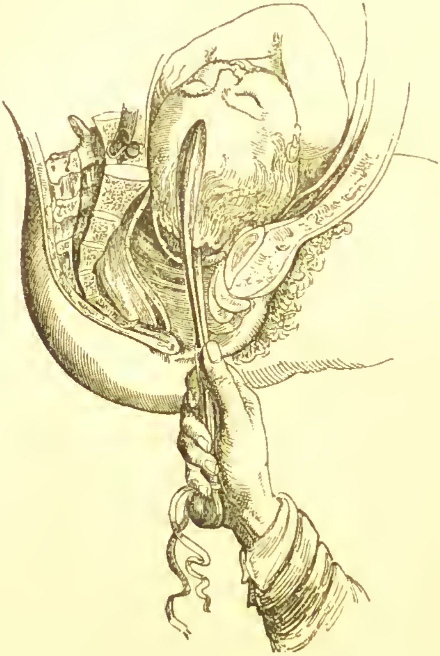


(*From Dr. Ramsbotham.*)

recourse to evisceration. The scissors must be plunged into the chest, and the contents broken up; the crotchet hooked upon the ribs, and traction exerted. The contents of the abdominal cavity may be evacuated in a similar way, and after this we shall generally be able to extricate the child.

If the craniotomy forceps be used, one blade must be passed into the skull, and the other on the outside, and sufficiently far to secure a firm hold (fig. 102); the blades then being closed, the operator must draw down firmly, yet gently, and at intervals.

Fig. 102.



(*From Dr. Ramsbotham.*)

In the woodcut, I have placed the instrument on the forehead of the child, in order to show its application; as a general rule, however, we should seize the occiput with it, unless there be special reasons for preferring some other part.

The principal *difficulties* of the operation are as follows:

1. If the bones of the skull be very firm, it is not easy to perforate, and the point of the scissors is very apt to slip. This can only be avoided by great care and steadiness.

2. A similar state of the bones will offer a serious obstacle to the insertion of the point of the crotchet; but a little perseverance will in most cases overcome it. The fingers of the left hand placed on the outside of the skull, will render it still more easy.

3. The extraction may be difficult. If the narrowing be not too great, the difficulty may be overcome by steady force; but if such a degree as may be exerted with impunity do not

move the head, we must then break up the skull, as already stated.

The *dangers* to which the patient may be exposed in this operation are more serious than when the forceps is used.

1. The perforator may slip, and the vagina or uterus be wounded.

2. The hook may slip, or the bone in which it is fixed may suddenly give way; and if the hand of the operator be not interposed, a severe or even fatal rent may be inflicted.

3. The perineum may be lacerated by the injudicious exertion of extracting force.

4. From the condition of the patient, she generally suffers more from the shock to the nervous system than in the operations previously described.

5. There is also greater danger of subsequent inflammation of the womb or vagina, with perforation of the bladder, especially if much force have been necessary.

After-treatment.—The nervous shock will be best remedied by quiet, small doses of opium, and moderate stimulation.

The state of the vagina and uterus should be carefully watched, and vaginal injections of warm water used occasionally.

If any symptoms of inflammation arise, they must be met promptly by the appropriate remedies,—venesection, leeching, calomel, and opium, &c.

In other respects, if the patient go on well, she must be treated as after natural labour.

CHAPTER XIV.

OBSTETRIC OPERATIONS. 6. THE CÆSARIAN SECTION, OR HYSTEROTOMY.

So far, I think, our investigations have fully borne out an observation made in a former chapter—viz., that obstetric operations formed an ascending series—each one exceeding the other in importance and danger; and that whilst no two could be compared on terms of equality, the value of each was shown by its alternative, which is always one of greater danger. Thus the mortality of premature labour is less than its alternative, the crotchet; that of the forceps less than the crotchet; and we shall now see that inasmuch as when it is employed early, the safety of the mother is nearly secured, the danger of embryotomy to her is far less than that of the Cæsarian section. This operation is indeed the *dernier ressort* of midwifery. Preferable as it is to the certain death of both parties, it is far more serious in its consequences than any other operation. It comes under the class of operations already noticed, in which the life of mother and child are necessarily more or less compromised.

It is of very ancient date, being known to the Greeks, and called *ὑστεροτομοτοκη*, or *ἐμβριοελκη*; but I believe by them only employed after the death of the mother. From the circumstances of several remarkable personages having entered the world in this way, it was deemed fortunate to be so born—a royal road, in short, to distinction. Pliny has recorded that Scipio Africanus was thus extracted. He says, "Auspicatius enecta matre nascuntur, sicut Scipio Africanus prior natus." He is not correct, however, in stating that Scipio was the first thus brought into this world; Claudius Cæsar, who distinguished himself in the war with the Samnites, having preceded him. From being thus "cut out" of their mother's womb, these individuals were first termed "Cæsones," afterwards "Cæsares," on the authority of Pliny, Festus, Pompeius, Solinus, &c. "Quia cæso matris utero in lucem prodiscunt." Cæso Fabius, who was three times consul, was thus extracted. Julius Cæsar is also stated to have been brought into the world by means of this operation, although it is an error to state that the name Cæsar was given to him on this account, inasmuch as he inherited it from his father. Among the ancients, persons thus born were considered sacred to Apollo, to which Virgil alludes in the lines—

> "Unde Lycham ferit exsectum jam matre peremtâ
> Et tibi, Phœbe, sacrum."—ÆNEID, x. 315.

Thus Æsculapius was called the son of Apollo, because (it is said) he was brought into the world by hysterotomy. For this reason, also, those things in Rome which were sacred to Apollo were preserved by the family of the Cæsars.

Some modern historians have included Edward VI., King of England, among those who benefited by this operation, and this statement is repeated in some works on midwifery. I have taken some trouble in tracing this story, and I find no reason to believe it to be true. Sir John Hayward, in his Life and Reign of Edward VI., was the first to put it upon record. He says, "All reports do constantly run that he was not by natural passage delivered into the world, but that his mother's body was opened for his birth, and that she died of the incision the fourth day following." That the latter statement is inaccurate, is proved by an examination of a MS. of the ceremonies of her funeral. Queen Jane Seymour died Oct. 24th, 1537, twelve days after King Edward's birth. With regard to the mode of the king's entrance into life, I shall quote the words of the compiler of these memoirs.

In the note, he observes that Sir John Hayward was the first to record the fact, "for none of our historians that wrote before Hayward give any countenance to this, but only mention her departure soon after, except it be Sanders (whose pen was not directed so much by truth as malice), who frames a story, that when the Queen was in extreme labour, they asked the King whom he would have spared—the Queen or his son? He answered, his son, because he could easily find out other wives. But yet even he has not a word of cutting the young infant out of his mother's belly." This story is manifestly fabulous, inasmuch as the fact of the infant being a son could not be known before its birth, and otherwise the point intended by it would be without force, because the king had already a daughter. The commentator adds, "that Dr. Burnet, now Bishop of Salisbury, mentions original letters in the Cotton Library, that show how the Queen was well delivered. These letters are exemplified in Fuller's Church History, the one from the Queen herself, and the other from her physicians, both written to the Privy Council." This evidence, I conclude, sets the question at rest, and I ought perhaps to apologize to my readers for occupying so much time with it; but it appeared to me to be as well to ascertain the truth about it.

There is also a tradition that Robert II., King of Scotland, was born by the Cæsarian section, an accident having happened to his mother.

To return to the regular history of the operation.

Rousset, about 1581, published a treatise on the Cæsarian section, in which he quotes ten successful cases. On one of the patients the operation was performed six times; she became pregnant a seventh time, and no one being willing to operate, she died undelivered. His essay was translated into Latin by Bauhin, 1661, and may be found in Stach's collection. To this work of Rousset's, Bauhin added an appendix of cases; he states that he saw the operation performed seven times.

There is no doubt that in many of these cases the operation was unnecessary; and one cannot feel quite sure of the trustworthiness of the reports of the cases. Mauriceau even asserts that "that which Rousset reports of the Cæsarian section is nothing but the ravings, capriciousness, and imposture of their authors."

There is no mention of the operation in Raynalde's work on the Byrth of Mankinde (1634), nor in the Childbearer's Cabinet, so that we are indebted to the French and Germans for our earliest information on the subject.

Ambrose Paré, whose work was translated in 1634 (having been written in 1570), was opposed to the performance of the operation on the living woman, on account of the danger of hæmorrhage, but recommends it for the purpose of saving the child when the mother has died suddenly.

In the translation of Guillemeau's work, 1635, there is a chapter on the Cæsarian section, which is recommended immediately after the death of the woman, "that thereby the child may be saved, and receive baptism." "In some women," the author observes, "I have made this practice very fortunately, and among the rest, in Mad. le Mabre, M. Phillippes, my uncle, being joined with me; and likewise in Mad. Pasquier, presently after she was dead, Mons. Paræus and the Curate of St. Andrew being present." As to performing it on living women in difficult labours, he says, "which for my owne part I will not counsell any one to, having twice made tryall of it myselfe, in the presence of Mons. Paræus, and likewise seene it done by MM. Viart, Brunet, and Charbonnet, all excellent chirurgions, and men of great experience and practice, who omitted nothing to do it artificially and methodically. Nevertheless, of five women in whom this hath been practised, not one hath escaped. I know that it may be alledged that there be some that have been saved thereby; but though it should happen so, yet ought we rather to admire it, than either practise or imitate it." . . . .
"After Mons. Paræus had caused us to make trial of it, and seene that the success was very lamentable and unfortunate, he left and disallowed this kind of practice, together with the whole colledge of Chirurgions of Paris."

In Chamberlen's translation of Mauriceau (1672), we find a strong protest against performing the operation on living women, and great doubts expressed as to its having ever been successful. He admits its utility when the mother is dead.

Dionis, whose work was translated in 1719, has a chapter on the Cæsarian section, which he recommends when the woman is dead, but deprecates it during her life. He describes the operation minutely.

Sir F. Ould, 1742, is the first British author I possess who notices the operation, which he says may be performed "either while the mother is living, or after her death, according to the nature of the circumstances." Nevertheless, he observes that the "Cæsarian operation is most certainly mortal, as we shall endeavour to prove presently from reason and the nature of the thing; and I hope it will never be in the power of any one to prove it by experience."

La Motte's work was translated in 1746. He neither discredits the cases related by previous authors, nor doubts the possibility of success; but he observes, "the os sacrum, ischium, operation may be useful "when about half an inch of addition to the short diameter (of the pelvis) is sufficient to allow delivery."

Dr. Hull, in his First Letter, 1790, points out the inadequacy of the operation: and in his Second Letter enters more fully into the history of it, and shows that the combination of symphyseotomy with craniotomy (first proposed by Dr. Hunter, and repeated by Mr. Simmons) is worse than the Cæsarian section.

Dr. Denman, in his Introduction to Midwifery, objects to the operation, except, perhaps, in a case where the life of a child (it being alive) was of such immense importance to the nation, that the mother might fairly run the risk.

By every modern British writer the operation is denounced, and is not likely ever to be again attempted in this country.

The contagion of enthusiasm spread rapidly among the French, though some more cautious and philosophical writers held aloof, and others decidedly disapproved of the new operation. It has not, however, even in more modern times, been so completely discouraged as we might have expected from the results of the cases in which it has been employed. The last case performed in France, was by M. Masleur, at Lagemont; the space gained admitted one finger between the divided symphysis; and the necessity for the operation may be judged by the fact that, after recovery, the patient bore a living child naturally!

The operation has been performed in Italy. It has also been modified by Prof. Catolica, after the suggestion of Desgranges and Champion. Instead of dividing the symphysis, the ossa pubis were cut through, nearer their junction with the ossa ilia, and by this means a positive increase in the antero-posterior diameter was gained. M. Galbiati performed this operation in 1819, and it proved fatal.

In Germany it was at first highly extolled; but the general opinion afterwards was unfavourable to its utility. Indeed, it would be astonishing to find any candid man who could resist the evidence afforded by the cases in which it has been tried.

Statistics.—49 cases have been recorded: of these 16 mothers died, or about 1 in 3 out of 40 cases; the child was born alive in 11, and dead in 19, or 1 in 2.

I shall not give these cases in detail, but a slight analysis may show more fully the slight ground the advocates of the operation had for exultation.

1. It was performed unnecessarily in four cases, as was proved by a subsequent natural delivery.

2. Without any cause in one case, the patient having borne children naturally, and there being no deformity; and in another, where there was sufficient space.

3. Without the possibility of benefit from it in one case, where the antero-posterior diameter was only $1\frac{3}{4}$ inch.

4. Although 33 mothers recovered, 10 children were lost, 14 saved, and 1 much injured. Of 7 nothing is stated. Of the 16 mothers who were lost, 5 of the children only were saved; 9 were dead, 1 much injured, and of 1 nothing is stated. So that,

5. In the latter case, 16 mothers were sacrificed to save 5 children.

6. Again, although 33 mothers recovered, yet to save 14 children they paid very dearly—for 1 had the bladder and urethra injured; 2 had incontinence of urine; 3 had prolapsus uteri. In one, the bones of the pelvis exfoliated, the cervix uteri and posterior part of bladder were gangrenous; and several were endangered by the operation, whilst of a great number no details are given.

We shall now examine the merits of the operation a little more minutely.

The *object of the operation* is to increase the short diameter of the pelvis, by the enlargement of the arch formed by the ossa ilia and pubis, so as to allow of the passage of the child in cases where it must otherwise have been extracted through an artificial opening; and by this means afford a greater chance of life both to the mother and child.

The *nature of the aid* afforded is easily comprehended, though the amount is altogether overrated by the early advocates of the operation. The cartilage of the symphysis pubis being divided, the pressure of the head, or the assistance of the operator, may separate the ossa pubis, at the expense of some of the sacro-iliac ligaments; for the separation of the ossa pubis will be *exactly in proportion to the yielding of the sacro-iliac synchondroses;* so that, if the latter were anchylosed, the operation would fail altogether.

Again, it must be remembered, that owing to the posterior situation of the sacro-iliac synchondrosis, the space gained will be *mainly in the oblique diameter of the pelvis; next to this in the transverse, and least of all in the antero-posterior diameter.* But it is from the *last mentioned diameter* being too short that the difficulty exists, and therefore *upon the amount gained in it* depends the successful issue of the operation.

The entire question turns upon this point. *If by the separation of the ossa pubis so much space be gained as will make up* *the difference between the sacro-pubic diameter in a deformed pelvis, and the same diameter in an ordinary one, then the operation is, at least mechanically, adapted to the object in view.*

Hence it is very important to ascertain as nearly as we can, how much may thus be added to the antero-posterior diameter. We know from Sigault and Le Roi's case, that the ossa pubis may be separated four inches: how much will this increase the short diameter? Dr. Bentley, in his Dissertation, quotes the experiments of Ripping of Paris, and Lobstein of Strasbourg, in support of the conclusion that the utmost gain by the operation is *four lines* in the short diameter, and Dr. Aitken says *half an inch.*

I feel satisfied myself that *half an inch* is the very utmost that can be gained, except by such violence as would be utterly unjustifiable. But then Dr. Leake observes that the head will press into the opening, and "it will therefore follow that as much of the occiput, or hind head, as is intruded into an aperture at the pubis of two inches and a half, so much precisely will be the space gained by this operation, and superadded to the short axis of the pelvis from sacrum to pubis, which will be equal to the enlargement from side to side—the circumstance here contended for." This is undoubtedly ingenious, but not quite correct, inasmuch as the long diameter of the head at the upper outlet corresponds with *one of the oblique*, and *not with the sacro-pubic diameter;* so that the occiput would correspond pretty nearly with the acetabulum, and the tuber parietale with the interval between the ossa pubis. In this situation, no part of the head could pass through the opening unless the operator changed its position. Further, Dr. Osborn has justly remarked, that this pressing into the opening would be at the expense of so much injury to the bladder and soft parts as would render the operation unjustifiable.

The *advantages* of the operation, as enumerated by its supporters, are:

1. That it substitutes an operation of less danger for the Cæsarian section; but this, we have seen, is not true, for although one in three of the mothers only are lost by it (rather less than by the Cæsarian section), yet those who recover are liable to accidents which fully counterbalance this slight advantage.

2. That it affords a better chance of saving the child; but we have seen that only one-half of the children were saved, whilst by the Cæsarian section more than two-thirds were preserved.

3. That it is a less painful operation. This is true as regards the period of operating, but if the period of convalescence be included with the sequelæ which occasionally occur, I should doubt the fact.

4. The section of the pubis which allows the child to be born by the natural passage, carries not with it those ideas of cruelty which the Cæsarian operation does, where the patient is, as it were, embowelled alive. This is very plausible but very false humanity.

The *objections* against the operation are to my mind unanswerable, although some that have been put forward as such have been refuted by experience. It must be remembered that the operation is contemplated for those cases in which the Cæsarian section would otherwise be necessary.

1. For these cases the operation is inadequate. In a former chapter, we have seen that the Cæsarian operation ought not to be performed in any case where the antero-posterior diameter is more than two inches, inasmuch as the delivery can be accomplished by a less hazardous method. Now, as the Sigaultian operation adds but half an inch (at the utmost), this would increase the antero-posterior diameter to 2½ inches. But it has been ascertained that a living child cannot pass through a pelvis whose short diameter is less than 3 inches; consequently, the Sigaultian section cannot avail in these cases, unless craniotomy be superadded. But the mortality of the two would be greater than that of the Cæsarian section, for 1 in 3 of the mothers would be lost, and all the children, by the combined operations; whereas by the latter, although 1 in 2¼ of the mothers are lost, more than two-thirds of the children are saved.

2. Even if the space gained would secure the delivery, the mortality of mothers and children would not justify its preference to the Cæsarian section—especially if we take into account the sequelæ. These objections appear to me quite conclusive against the operation; but as others have been adduced, it may be as well to enumerate them.

3. The cartilage of the symphysis may be ossified; which will render the operation impracticable, even after it has been commenced.

4. Great injury may be inflicted by the knife on the bladder or soft parts within the pelvis.

5. Equal injury may happen from the violence used in separating the ossa pubis.

6. The soft parts may be injured by pressure against the edges of the divided ossa pubis.

7. The sacro-iliac synchondroses may be ruptured past remedy.

8. The divided cartilages may not unite. Experience, however, has shown the groundlessness of this objection.

9. The admission of external air may excite inflammation.

These latter objections have, of course, a certain weight, but hardly sufficient to prohibit the operation, if it were adapted for the cases for which it has been proposed.

But there is another class of cases for which it would seem at first sight more suitable, and which, indeed, appear to have been contemplated by those who recommend its performance, where the antero-posterior diameter of the upper outlet is three inches. I mean those cases where the difficulty is too great for the forceps, and in which, as we have seen, craniotomy is necessary. Here the gain of half an inch might enable a living child to pass. But the operation is objectionable in these cases, because of the results; for independent of the ill consequences to those who recover, we find that one in three of the mothers die, and only half of the children are saved; whilst, although all the children are sacrificed by craniotomy, only one in five of the mothers die. And it must also be borne in mind, that these results of craniotomy have occurred under more unfavourable circumstances than those of the Sigaultian operation.

From these considerations, I trust that my readers will agree with me in the following conclusions :

1. That the Sigaultian operation is undeserving of the encomiums passed upon it, inasmuch as it offers no increased chance of safety to the mother or child—the statistics of the cases in which it has been tried having shown that one in three of the former, and one-half of the latter, are lost; besides that in those of the mothers who recover, much inconvenience is experienced from the consequences of the operation.

2. That it is perfectly inadmissible as a substitute for the Cæsarian section, because the utmost space gained by it would not permit the child to be born alive in any case in which the Cæsarian operation *ought to be* contemplated; and if the child must, in addition, be destroyed, the combined mortality of the mothers and children would then be far greater than from the Cæsarian operation.

3. That it is equally inadmissible as a substitute for craniotomy alone, in cases where the forceps are inadequate, because the consequences to the mother are more serious from it than from craniotomy.

If, as I believe, these conclusions are correct, I need only add an account of the mode of performing the operation, not as a model, but to complete its history. Perhaps the best mode of doing this is to give the account of one of M. Sigault's cases, abridged by Dr. Osborn. "Mons. Sigault, with a common histoury, cut through the integuments and linea alba, beginning the operation at the upper and central part of the symphysis pubis; then introducing his forefinger as a director, he cut through the ligaments and cartilage; immediately on the completion of which, the two ossa pubis, with a peculiar noise, spontaneously separated two inches and a half: this was demonstrable, for M. Le Roi laid his four fingers into the opening. M. Sigault immediately introduced his hand into the uterus, broke the membranes, and brought down the feet. M. Le Roi accomplished the delivery. The whole operation, both section and delivery, was finished in five minutes. The child was born alive. A ligature was passed round the body of the mother, to keep the pelvis firm. The patient having no bad symptoms, was left till the next day, when every circumstance continued favourable; she had passed her urine voluntarily twice, there had been no hæmorrhage, and she had suffered little pain."

Having entered thus fully upon the operations proposed for the relief of the previous classes of unnatural labour, we may now resume the consideration of the remaining deviations from natural labour.

CHAPTER XVI.

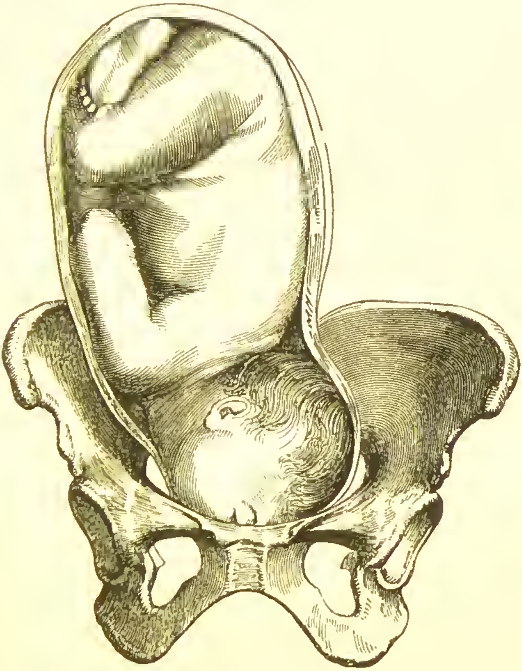
PARTURITION. CLASS II. UNNATURAL LABOUR.
ORDER 5. MAL-POSITION AND MALPRESENTATION OF THE CHILD.

We have already investigated those cases of unnatural labour which arise from defective uterine power, and from an abnormal condition of the passages. The only class of deviations which remains, is that which is caused by some peculiarity on the part of the child. In these cases we assume that the uterine power is intact, and that there is no impediment in the passages. The difficulty is a purely mechanical one; but if it be not removed, after a certain time the constitution is involved, and the characteristics which we noticed in powerless labour present themselves. Thus, as in the case of defective passages, that which at first was purely local and mechanical, involves at length the vital powers and the constitution of the patient.

We shall first notice certain mal-positions. 1. Face presentations, as they are called; and 2, those cases in which the forehead emerges under the arch of the pubis.

MAL-POSITIONS. 1. FACE PRESENTATIONS. At first sight it may seem strange to call a "face presentation" a mal-position; but a moment's thought will show that when the face is planted across the upper outlet, it is merely because, from some cause, the head which presented has deviated from its usual mode of descent. Dr. F. Ramsbotham remarks, "I am inclined to think that most of the face presentations we meet with in practice, were originally brow presentations, and have been changed by the action of the uterus in the way I have already specified." In face presentations the head is bent backwards, so as to place the face nearly flat across the brim of the pelvis in its oblique diameter.

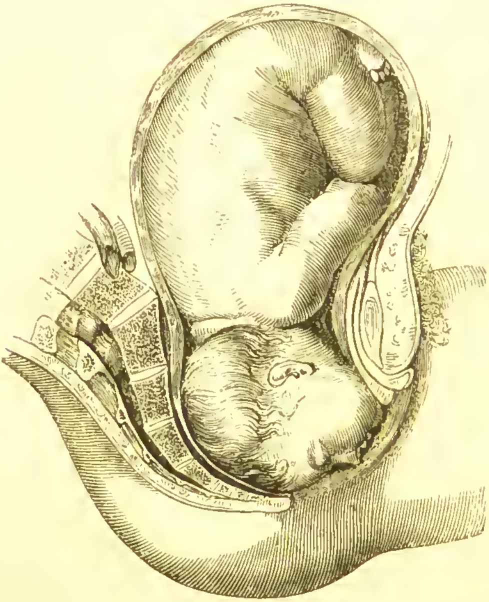
Fig. 103.



(*From Moreau.*)

MECHANISM.—The face may present in two positions, according as the forehead is towards one or other os ilium. In the *first* *position*, the forehead is towards the left ilium, or rather the left acetabulum, and the chin towards the right ilium, or right sacroiliac synchondrosis, the bridge of the nose representing the line described by the sagittal suture in the first cranial position (fig. 103). The right side of the face is anterior, and being anterior is more depressed than the other upon entering the brim, so that, on making an examination, the finger touches the right eye or the zygoma, and upon this part the primary tumour forms. M. Naegelè remarks that there forms "a swelling, first upon the upper part of the right half of the face, which in this species of face presentation (*first position*) is always situated lowest." If the progress of the head through the external passages be unusually rapid, this is the only tumefaction observed; "but if it advance slowly, and the head remain a long time in the cavity of the pelvis before it actually enters the vagina, the inferior half of the right side of the face, viz., part of the right cheek, will be remarked after birth as being the principal seat of the swelling.

Fig. 104.



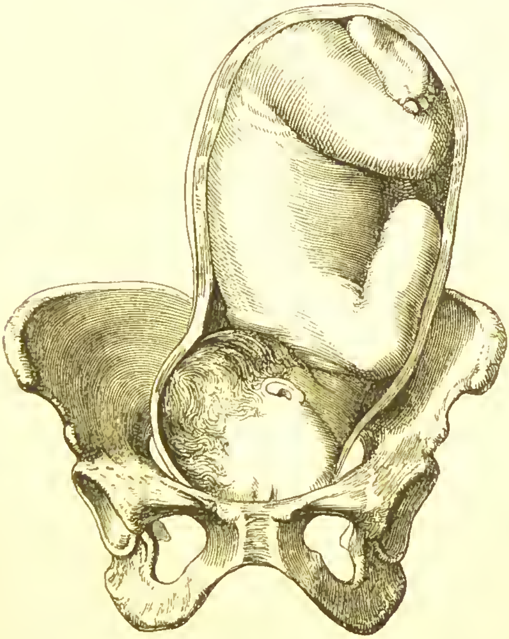
(*From Moreau.*)

The head, as we have said, enters the brim obliquely as to its diameter and plane, and thus descends into the cavity; when there, the chin makes a turn from right to left, and so emerges obliquely under the arch of the pubis (fig. 104) whilst the vault of the cranium sweeps over the perineum.

The first position is by far the most frequent.

The *second position* is the reverse of the first: the forehead is turned towards the right acetabulum, and the chin to the left sacro-iliac synchondrosis (fig. 105.) The primary tumour forms on the upper part of the left cheek, and the secondary (if there be two) on its lower part: the face enters the cavity obliquely, and so emerges from the outlet; but the chin makes a quarter turn from left to right anteriorly, and when expelled is under the arch of the pubis, whilst the head sweeps over the pelvis.

Fig. 105.



(*From Moreau.*)

The older writers describe the head as emerging from the lower outlet in face presentations, with the chin towards the perineum; and Dr. Smellie has given a plate in illustration of this. A moment's examination will show that this is mechanically impossible, and the careful observation of Naegelè and others has been unable to detect any such case.

STATISTICS.—*Frequency.*

a. *British Practice.*

Authors.	Total No. of Cases.	Face Present.
Dr. Jos. Clarke.	10,387	44
P.P. . . .	3,847	7
Dr. Merriman .	2,947	10
Dr. Granville .	640	1
Dr. S. Cusack .	701	3
Dr. Maunsell .	839	7
Mr. Gregory .	691	2
Dr. Thos. Beatty	1,184	4
Dr. Collins . .	16,414	33
Dr. Lever . .	4,666	24
Dr. Reid . .	5,691	25
Drs. M'Clintock & Hardy	6,634	14
Dr. F. Ramsbotham . .	48,996	162
Dr. E. Murphy .	467	7
Dr. Metcalf . .	300	1
Mr. Crosse . .	1,394	5
Mr. Earle . .	4,320	4
Birmingham H.	650	13
Mr. Rose . .	600	1
Mr. Bailey . .	2,819	15
Mr. Watson . .	800	14
Dr. Copeland .	1,290	7
Dr. Bliss . .	771	8
Dr. Pagan . .	8,684	6
Mr. R. U. West	2,106	10
Mr. J. Thompson	3,300	6
Drs. Sinclair & Johnston	13,748	40
Dr. Hall Davis .	13,783	123
Mr. Harrisson .	1,000	2
Mr. Smart . .	5,026	7
Dr. Lawrence .	1,000	1

b. *French Practice.*

Authors.	Total No. of Cases.	Face Present.
Mad. Boivin .	20,517	74
Mad. Lachapelle	15,652	65
M. Ramboux .	491	3
M. Dubois . .	10,742	30
Dr. de Belli . .	2,739	17

c. *German Practice.*

Authors.	Total No. of Cases.	Face Present.
MM. Moschner and Kursak	12,329	122
Dr. Carus . .	2,557	24
Dr. A. E. v. Siebold .	1,003	10
Dr. E. C. v. Siebold .	491	4
Dr. Kilian . .	9,392	122
Dr. Merrem . .	157	1
Dr. Naegelè . .	115	4
Dr. Klugè . .	799	6
Dr. Brunatti .	100	2
Dr. Adelmann .	57	1
Dr. Jansen . .	13,365	15
Dr. Arneth . .	6,608	40
Prof. Schwerer .	21,804	50
Wurtzburg Hos.	637	10

Thus, in British practice, out of 154,766 cases, there were 590 face presentations, or 1 in 262; among the French, 50,141 cases, and 189 face presentations, or about 1 in $265\frac{1}{3}$; and among the Germans, 69,417 cases, and 411 face presentations, or about 1 in $169\frac{1}{2}$; the whole giving 1190 face presentations in 274,324 cases, or about 1 in $230\frac{1}{2}$ cases.

As to the mode of delivery, and results to mothers and children, I cannot make out a regular table, but must content myself with such scattered notices as I have been able to obtain. Mr. Giffard relates 4 cases; 1 was delivered naturally, and 3 with the forceps; neither mothers nor children were lost. Dr. Smellie gives 19 cases; 3 delivered naturally, 5 by version, 4 by the forceps, and 5 by craniotomy; 3 mothers and 11 children were lost. Mr. Perfect relates 8 cases: 1 delivered naturally, 2 by version, 4 by forceps, and 1 by craniotomy; none of the mothers, but 2 of the children, were lost. Dr. Jos. Clarke performed craniotomy twice in his 44 cases; all the rest were delivered naturally. Dr. Ramshotham has recorded 3 cases: 2 delivered by the forceps, and 1 by craniotomy; all the children were lost, but none of the mothers. Dr. Granville's single case was delivered by version. Dr. Cusack's 3 cases were delivered naturally; neither mother nor child was lost. Dr. Collins' 33 cases were all delivered naturally; the mothers were saved, and but 4 of the children lost, 1 of which was an acephalous fœtus. All Dr. Pagan's 6 cases were delivered naturally; all the mothers recovered, and 5 of the infants were saved. All Mr. Thompson's cases, mother and child, recovered.* Drs. Johnston and Sinclair lost 6 children, and one mother died of peritonitis.† Dr. Hall Davis lost 11 children.‡ Of Mr. Smart's 7 cases, 2 children were lost.

Of Madame Boivin's 74 cases, we are informed that 41 were delivered naturally, 14 by version, and 2 by craniotomy, but nothing is said of the mortality. Of Madame Lachapelle's 65 cases, 41 were delivered naturally, 20 by version, and 4 by the crotchet; 7 children are stated to have been lost.

Of 80 cases under the care of Dr. Boer, of Vienna, all but one were delivered without assistance; in that one case the forceps were used. None of the mothers suffered, and 3 or 4 of the children only were lost. Of Dr. A. E. v. Siebold's 10 cases, 6 were delivered by the forceps. Of the 40 cases related by Dr.

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* Glasgow Med. Journal, July, 1855, p. 130.

† Practical Midwifery, p. 75.

‡ On Diff. Parturition, p. 324.

Arneth, all were delivered by the natural powers; 3 boys and 2 girls were lost.*

Thus, so far as our data go, out of 384 cases, 248 were delivered naturally, and 77 required artificial assistance (*i.e.*, 42 version, 20 forceps, and 15 craniotomy). In 190 cases where the result to the mother is given, 3 died, or 1 in 60; and of 256 children, 19 were lost, and 15 destroyed, or about 1 in 7.

It is worthy of remark, that the mortality among both mothers and children is greatest when assistance was given; for of Dr. Collins' 33, M. Boer's 80, and Dr. Arneth's 40 cases, delivered naturally, none of the mothers, and but 12 of the children, were lost. These notices show also the change of opinion as to the necessity for assistance.

Causes.—It is very difficult to assign correct causes for this mal-position. It may be owing to some shock—coughing, for instance, or sudden uterine action, just before the head takes up its permanent position at the brim.

Sir James Simpson attributes mal-position and mal-presentations generally to the following causes:—

1. Prematurity of the labour: parturition occurring before the natural position of the fœtus is established.

2. Death of the child in utero; or, in other words, the loss of the adaptive vital reflex actions of the fœtus.

3. Causes altering the normal shape of the fœtus or contained body, or causes altering the normal shape of the uterus or containing body, and thus forcing the fœtus to assume, in its reflex movements, an unusual position in order to adapt itself to the unusual circumstances in which it happens to be placed.

4. Preternatural presentations are occasionally the result of causes physically displacing either the whole fœtus or its presenting part, during the latter periods of gestation or at the commencement of labour.

Diagnosis.—"The presentation of the face," says Dr. Denman, "is discovered by the general inequalities of the presenting part, or by the distinction of the particular parts, as the eyes, nose, mouth, or chin. There is no very great difficulty in making out this presentation before tumefaction takes place: but afterwards it may be mistaken for the breech, unless we are very careful. The bridge of the nose will be the best guide, as being prominent, firm, and unlike any part of the breech. The eyes or mouth may be confounded with the anus, and the malar bone with the tuber ischii.

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* Die Geburtshülfliche Praxis, &c., zu Wien. Von Dr. F. H. Arneth. 1851, p. 45.

SYMPTOMS.—The only effect which a face presentation has upon labour is to retard the second stage, but not to such an extent, or very rarely, as to give rise to unfavourable symptoms. The resistance to be overcome is greater, because the bones of the face and base of the cranium which pass the first through the brim, cavity, and outlet are incompressible, and because there is not the same power of adaptation; but the impediment only calls forth more energetic action on the part of the uterus, and we perceive that the progress of the labour, if slow, is still evident. The suffering, of course, is more severe, as well as more prolonged. The child when born is a frightful object in most cases; one eye closed, and the half or the entire of one cheek swollen, red, and contused; but these injuries speedily pass away, and in a day or two the face assumes its ordinary aspect. I should mention, that if a rough and careless examination of the presenting part be made in these cases, the eye may be seriously damaged, or even destroyed. The mortality amongst the children is rather more than in head presentations, but less than in any other mal-presentation.

If, as is very rarely the case, the delay should be excessive, the symptoms of powerless labour will be developed, and will call for prompt relief.

TREATMENT.—Formerly, when this mal-position was regarded as an unnatural presentation, it was held necessary or advisable to deliver the patient by art without loss of time, as appears from the statistical results of the operation. M. Portal appears to have been the first to suspect that nature might be adequate to the delivery, and Deleurye concurred in this opinion. M. Boer, in 1793, objected to any interference; and of late years it has been established as a rule, that assistance is unnecessary merely on account of the mal-position. If there should be any disproportion between the size of the head and the pelvis, or the pains should become inefficient, or accidental complications occur, then of course we must have recourse to the *mildest* form of assistance. If within reach, the forceps will probably be the best instrument.

In ordinary cases we must keep up the courage of the patient, and exercise all our own patience and kindness until the delivery be effected.

If there be a difficulty in establishing respiration, after the birth of the child, as from the cerebral congestion there may be, the cord must be divided, and an ounce or two of blood allowed to escape, previously to applying the ligature. The child's face may be fomented with a decoction of chamomile flowers or poppy heads, and afterwards bathed frequently with a spirit lotion.

2. The forehead towards the arch of the pubis.—When describing the mechanism of parturition, it was stated, that when the head presents in the third or fourth position, it ordinarily changes into the second or first in its passage through the pelvis, but that occasionally this change of position does not take place, and that the head then passes down through the lower outlet, with the forehead turned obliquely under the arch of the pubis. When there, the head may be forced equally down, if there be room, presenting the longitudinal diameter (a little modified) to the antero-posterior diameter of the lower outlet, or the forehead may remain stationary at the pubis whilst the posterior part of the head sweeps over the perineum.

Statistics.—*Frequency.*

Authors.	Total No. of Cases.	Forehead to Pubis.
Dr. Bland	1,897	5
Dr. Merriman	2,947	44
Dr. Granville	640	2
Dr. Cusack	303	2
Dr. Maunsell	849	7
Dr. Collins	16,414	12
Dr. Storer	440	1
Mr. Crosse	1,394	26
Dr. Toogood	1,135	8
Dr. Metcalf	300	1
Dr. Pagan	8,684	31
Mr. R. U. West . . .	2,106	59
Mr. J. Thompson . . .	3,300	28
Drs. Johnston and Sinclair	13,748	20
Mr. Harrisson	1,000	15
Dr. Cross	4,733	48
Mr. Smart	5,026	20
Dr. Lawrence	1,000	10
Mr. Dunn	3,821	11

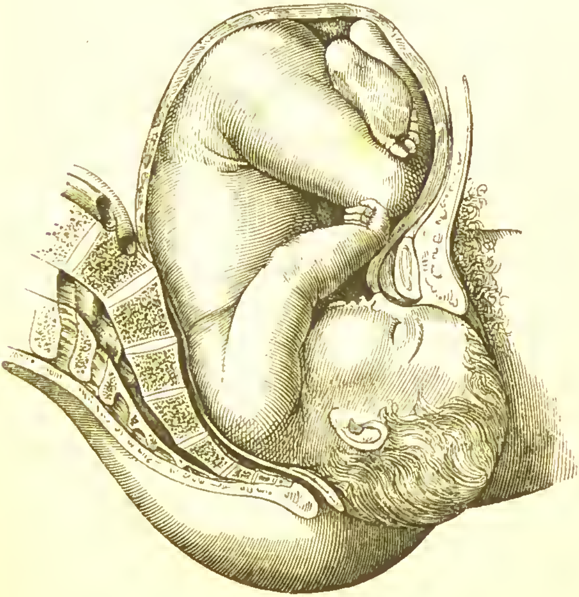
Thus, in 58,947 cases, the face was turned to the pubis 260 times, or about 1 in 226½.

As to the result to the child; of 70 cases where the result is specified, 15 were lost.

Causes.—It is not easy to explain why the ordinary change does not take place. I have observed that it may be prevented if the pelvis be somewhat narrower than usual, and especially if it be funnel-shaped: also, if the pelvis be disproportionately large, as due resistance will then be wanting; and lastly, if very violent pains come on suddenly just after the head has entered the brim. It is probable that other causes may produce similar effects, but they are not so easily detected.

DIAGNOSIS.—The mal-position will be detected by the flatter shape of the forehead, which does not fill up the arch of the pubis so well as the posterior part of the head; and especially by the situation of the fontanelles, the larger ones being anterior, and the smaller ones posterior, by the nasal prominence. and by the edge of the orbits.

Fig. 106.



(*From Moreau.*)

SYMPTOMS.—The effects of this mal-position upon labour in its second stage are by no means serious; in ordinary cases it causes some delay at the latter part of it, and calls for more expulsive force; but the effort is successful, and the child is expelled. If, however, the pelvis be narrower than usual, it may offer a considerable impediment, as a larger diameter is presented to the lower outlet than in the usual position. I have seen a few cases in which the impediment, though so slight, was sufficient to cause mischievous delay even in women who had borne children before, and whose pelvis was perfectly well formed.

The effect upon the child is generally of no moment, unless the pelvis be so deficient as to require an operation.

Treatment.—If the pelvis be not smaller than usual, assistance will rarely be necessary; and, if we suspect a narrowing, still sufficient time must be allowed to prove whether the relative disproportion be such as the natural agents can overcome. If it be not, then, after a due and careful estimate of the obstacle, we must determine whether there is room for the application of the forceps, or whether the only alternative is craniotomy. In some few cases the forceps may be necessary from a failure of the uterine power. The time for operating must be determined by the amount of the obstacle, and the symptoms present.

Mal-presentations.—Having taken the presentation of the head as a type of natural labour, we must include the presentation of any other part of the body under the class of mal-presentations. If we were to follow implicitly Baudelocque, and other foreign authorities, there is scarcely any part of the body which may not present; but Denman, Lachapelle, and Naegelè consider that such regions as the back, loins, belly, neck, &c., never constitute the presenting part.

Taking the presentations in the order of frequency, we shall now inquire into

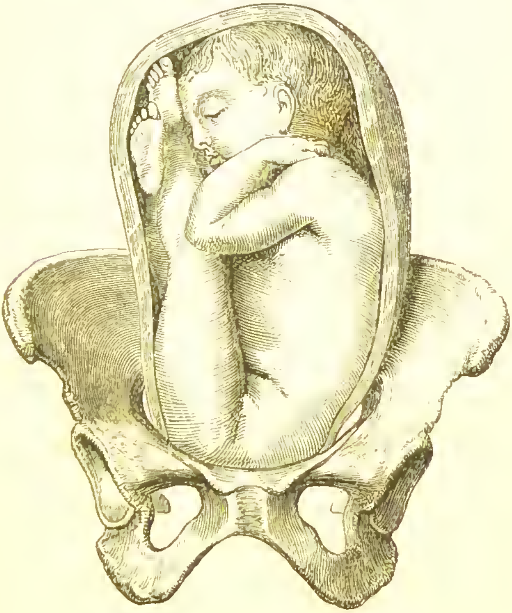
1. Breech presentations, 1 in 63.
2. Presentation of the inferior extremities, 1 in $106\frac{1}{2}$.
3. ,, of the superior extremities, 1 in $235\frac{1}{2}$.
4. Compound presentations, where two or more parts present at the brim.

1. Presentation of the Breech.—The breech may present itself at the brim in different positions; but as it enters it will be found to arrange itself so that either, 1, the back of the child shall be turned anteriorly towards the belly of the mother; or, 2, the back of the child shall look posteriorly towards the back of the mother. Not that the back of the child is directly anterior or posterior, but oblique, the transverse diameter of the child's hips corresponding to one or other of the oblique diameters of the brim.

"In every case," observed M. Naegelè, "whether the nates have at first a completely transverse or oblique direction, they will always be found, on pressing lower into the superior aperture of the pelvis, to have taken an oblique position, and that ischium which is directed anteriorly to stand the lowest. They pass through the entrance, cavity, and outlet of the pelvis in this position, which is oblique both as to its transverse diameter as well as to its axis."

Thus, in the *first* and most frequent position (fig. 107), the left ischium corresponds to the left acetabulum, and, being anterior, it is depressed, and presents at the os uteri, so that the finger impinges upon it if it be passed into the centre of the os uteri. In this oblique position the breech descends into the cavity, and this part first passes through the vaginal orifice, and appears between the labia; whilst the other ischium sweeps over the perineum, and the belly of the child is towards the inner sur-

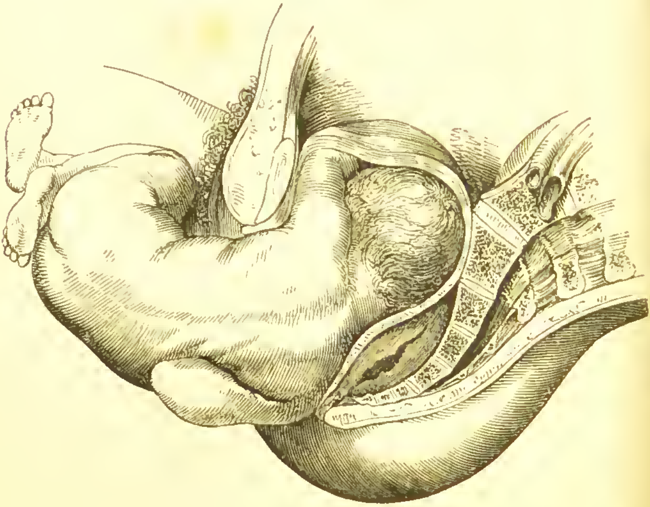
Fig. 107.



(*From Moreau.*)

face of the right thigh of the mother. "The rest of the trunk," according to the admirable description of the author just quoted, "follows in this position; and as the breast approaches the inferior aperture of the pelvis, the shoulders pass through its superior aperture in the *left* oblique diameter; and during its passage (viz., the breast) through the pelvic outlet, the arms and elbows, which were pressed against it, are born at the same moment." It is not always the case that the arms are pressed close to the side of the child, one or both may be stretched out above the head, and then, as labour advances, first one will be pressed through the orifice, generally the right (fig. 108), and then the other, or it may be necessary to draw them down.

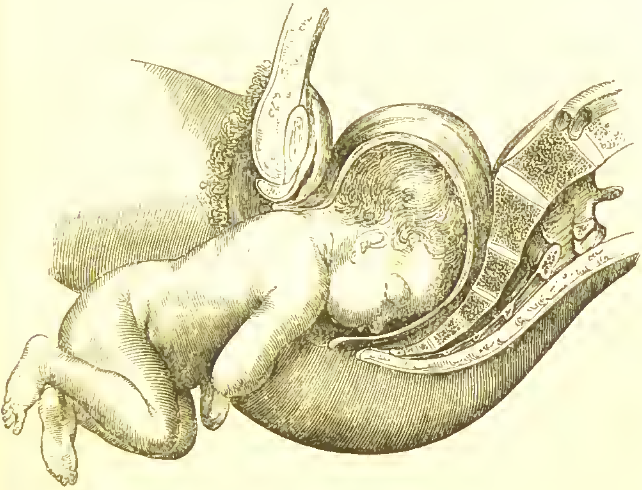
Fig. 108.



(*From Moreau.*)

"But whilst the shoulders are descending in the above-mentioned oblique position, the head, which during the whole progress of the labour rests with its chin upon its breast, presses into the superior aperture in the direction of the *right* oblique diameter (viz., with the forehead corresponding to the right sacro-iliac synchondrosis), and then into the cavity of the pelvis in the same direction, or one more approaching the conjugate diameter. After this, it presses through the external passage and the labia in such a manner, that while the occiput rests against the os pubis, the point of the chin, followed by the rest of the face, sweeps over the perineum as the head turns on its lateral axis from below upwards." (Fig. 109.) This brings the occipito-frontal diameter of the head in correspondence with the long diameter of the outlet.

Fig. 109.



(*From Moreau.*)

In the *second* position, the right ischium, corresponding to the right acetabulum, is turned forward and depressed, passing obliquely through the cavity and outlet in the former case, but with the direction of its surface reversed; its anterior surface being directed towards the left side of the pelvis and left thigh of the mother, whilst the head enters in the left oblique diameter.

The tumour (marked by a red or livid spot) will be found on the left or right ischium, according as it was the first or second position.

M. Naegelè has noticed two deviations from the ordinary mechanism of breech cases which I shall give in his own words. First: "It sometimes happens that the body, which, directed with its anterior surface forwards and to the right, or forwards and to the left, is born as far as the shoulders, turns itself then (and frequently during the course of a single pain, by which it is fully expelled) from the side completely forwards, and then to the opposite side, so that the anterior surface of the child, which for instance in the first case, was, before the pain came on, still directed forwards and to the right, will be afterwards instantly, in the twinkling of an eye, situated backwards and to the left." Dr. Collins has noticed this change as rendering the interference recommended by some authors unnecessary.

The second deviation is thus described by Naegelè: "It sometimes happens, in presentations of the nates, that the head does not rest with the chin upon the breast: but the occiput, as in those of the face, is pressed against the nape of the neck; in this case the passage of the breech through the pelvis, according to which species of nates presentation it may be, follows in the manner already described, as far as the head; this, with the occiput depressed on the nape of the neck, enters the superior aperture with the vertex corresponding to one or other ilium of the mother, and in passing through it, and pressing lower into the cavity of the pelvis, the vertex gradually turns more and more backwards, so that when the trunk is born, the arch of the cranium is directed to the hollow of the sacrum, and the inferior surface of the under jaw to the internal one of the symphysis pubis. The passage through the inferior aperture takes place in the following way—viz., whilst the under jaw presses with its inferior surface against the os pubis, the point of the occiput, with the vertex, followed by the forehead, sweeps first over the perineum." Thus bringing the occipito-mental diameter of the head into a position with the antero-posterior diameter of the outlet.

Thus, as I observed in speaking of the passage of the head, whether we consider the ordinary or extraordinary adaptation of the diameters in breech presentations, we see at once the admirable way in which the arrangements are calculated to provide for the passage of the child with the least possible waste of space; and it may convince us that in far more cases than we should *à priori* suppose, nature is adequate to the fulfilment of the functions of parturition; and interference, when injudicious, is more likely to impede than to further her efforts.

STATISTICS.—*Frequency.*

a. *British Practice.*

Authors.	Total No. of Cases.	Breech present.
Dr. Bland . .	1,897	36
Dr. Jos. Clarke .	10,387	61
Dr. Merriman .	2,947	78
Dr. Granville .	640	2
Edin. Lying-in Hospital .	2,452	17
Dr. Cusack . .	701	14?
Dr. Maunsell .	416	6
Mr. Gregory . .	691	14
Dr. Collins . .	16,414	212
Dr. Beatty . .	1,182	28
Dr. Lever . .	4,666	59
Dr. Reid . . .	3,250	79
Mr. Warrington.	110	4
Mr. French . .	89	2
Dr. Churchill .	1,525	35
Drs. M'Clintock and Hardy	6,634	101
Dr. Storer . .	440	5
Mr. Crosse . .	1,394	25
Mr. Earle . .	4,320	41

Authors.	Total No. of Cases.	Breech present.
Mr. Rose . . .	600	9
Dr. Bliss . . .	771	15
Birmingham H. .	650	17
Dr. Metcalf . .	300	3
Dr. Toogood . .	1,135	11
Dr. J. Lee . .	850	5
Mr. K. Watson .	800	11
Dr. Copeland .	1,290	13
Dr. Pagan . .	8,684	131
Mr. R. U. West .	2,106	27
Mr. J. Thompson	3,300	18
Drs. Johnston and Sinclair	13,748	309
Dr. Hall Davis .	13,783	161
Mr. Harrison .	1,000	26
Dr. Cross . . .	4,733	96
Mr. Smart . .	5,026	66
Dr. Lawrence .	1,000	9
Mr. Dunn . .	3,821	25
Mr. Bailey . .	6,476	45
Dr. Steele . .	5,310	67

b. *French Practice.*

Authors.	Total No. of Cases.	Breech present.
Mad. Boivin . .	20,517	373
Mad. Lachapelle	15,652	349
M. Ramboux .	491	4
M. Dubois . .	10,742	391

Authors.	Total No. of Cases.	Breech present.
Hôtel Dieu, Paris	280	3
M. Mazzoni . .	452	5
Dr. de Belli . .	2,739	44

c. *German Practice.*

Authors.	Total No. of Cases.	Breech present.	Authors.	Total No. of Cases.	Breech present.
M. Richter . .	2,571	48	Dr. Klugè . .	1,074	27
Moschner and Kursak .	12,329	125	Dr. Carus . .	2,908	43
A. E. v. Siebold	1,944	44	Dr. Brunatti .	295	6
E. C. v. Siebold	1,165	18	Wurtzburg Hos.	637	18
M. Kilian . .	2,350	125	Dr. Theys . .	28	1
M. Naegelè . .	1,411	76	Dr. Adelmann .	53	2
Dr. Merrem . .	299	14	Dr. Arneth . .	6,608	113
Dr. Henne . .	555	6	Prof. Schwerer .	21,804	97

Thus, in British practice, breech presentation occurred 1691 times in 122,679 cases, or about 1 in $72\frac{1}{2}$; in French practice 1169 times in 50,873 cases, or about 1 in $42\frac{3}{4}$; and in German practice 793 times in 54,794 cases, or about 1 in $66\frac{1}{2}$; the entire number of breech presentations being 3653 in 228,346 cases, or about 1 in 63.

The following table exhibits the result to the child in as many cases as I could collect:—

Authors.	No. of Breech Presentations.	Children lost.
Mr. Giffard	13	4
Dr. Smellie	27	16
Mr. Perfect	9	2
Dr. Jos. Clarke	61	21
Dr. Ramsbotham	14	7
Dr. Merriman	79	9
Edinburgh Hospital	17	5
Mr. Gregory	14	4
Dr. Collins	242	73
Dr. Beatty	28	12
Mr. Lever	59	30
Dr. Churchill	35	14
Drs. M'Clintock and Hardy . .	80	34
Dr. Metcalf	3	0

Authors.	No. of Breech Presentations.	Children lost.
Dr. Storer	5	0
Dr. Arneth	113	19
Mr. J. Thompson	18	5
Drs. Johnston and Sinclair*. .	258	84
Dr. Hall Davis	161	31
Mr. Smart	66	18
Dr. Lawrence	9	3
Mr. Dunn . . . . , ...	25	9
Mr. Bailey	45	0

Thus, in 1361 cases of breech presentations, 380 children were lost, or about 1 in 3$\frac{2}{3}$.

Diagnosis.—The breech of the child is distinguished by its roundness and softness, by the cleft between the buttocks, by the anus, and by the organs of generation; and it would seem unlikely that it should be mistaken for anything else. Yet it may be confounded with a face presentation which has advanced slowly, and where there is much swelling; to the touch there is really a great similarity, but in the latter we have the bridge of the nose obliquely across the os uteri, and in the former the more or less moveable coccyx may be felt close to the anus, and joining the broader and firm sacrum. This will also distinguish it from a shoulder presentation, which might be mistaken for one of the tubera ischii.

The discharge of meconium is of very little value, as it occurs in head presentations, although in the latter case Dr. Collins remarks, "it comes away in a more fluid state, and has not its natural appearance, being mixed with the discharges from the uterus and vagina;" nor is it found on the end of the finger after examination.

Symptoms.—The duration of the labour varies a good deal; in some cases, it is concluded as quickly as if the head descended, in others it is more tedious; there is more delay when the arms are stretched upwards than when they are down by the side. There is also delay in the expulsion of the head, owing to the incompressibility of the base of the skull, which is the first to enter, and its being less able to adapt itself to the brim. It is very seldom that any bad symptoms arise on the part of the mother, as assistance is generally afforded; but there is danger that mischief may be done if the interference be not judiciously timed, and gently executed. If there be any narrowing of the brim, there will be proportionate delay; and if the patient be not delivered, the symptoms of powerless labour may be developed.

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* Fifty-six in addition were putrid, and one in addition to Dr. Davis's cases; but in estimating the mortality resulting from the presentation, these clearly ought not to be included.

That there is danger to the child, the statistics I have given prove, more than one in four being lost, and this is owing to the delay in the transmission of the head. The body does not dilate the passages so well as the head, as the head is wider than any part of the body, or at least the body may be compressed into a smaller space than the head. This of course occasions the head to pass slowly; but besides, a little time is required to allow of the adaptation of the head to the brim, cavity, and outlet, and for such compression as can be made; and as, during this time, the cord is exposed to pressure, it is not surprising that asphyxia or pulmonary apoplexy should result, of which the child generally dies. Even where the life of the child is saved, the pressure to which the organs of generation have been exposed may be followed by inflammation and sloughing, according to Denman.

Treatment.—A very minute and thorough examination is necessary in these cases, to assure ourselves of the accuracy of our diagnosis; but this once done, the less frequently the examinations are renewed the better, lest the parts should be irritated. As to the actual management, I must repeat what I have said before, that the less interference the better for the patient. Dr. Collins remarks most soundly, that "the most common and dangerous errors committed by the medical attendant arise from officious and injudicious attempts to hasten or assist during the early stages of labour, than which he could not well adopt a more hazardous course. No interference whatever is required until the breech shall have been expelled through the external parts, unless the uterine action be inadequate to effect this; otherwise the child must often be forfeited, owing to the difficulty experienced in consequence of the soft parts being badly prepared to admit the passage of the head. This being the most critical part of the delivery, should much delay take place, the continued pressure on the funis speedily deprives the child of life. To guard against this, therefore, the breech should be permitted to pass slowly and unassisted, so as gradually and perfectly to dilate the soft parts, thereby gradually facilitating the completion of the labour."

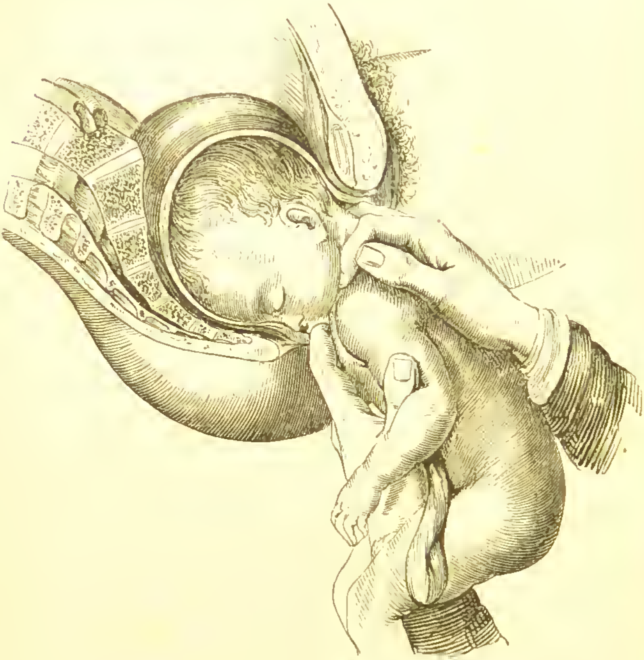
At the same time, as the breech passes, the perineum must be carefully guarded with the left hand, whilst the right is employed in supporting the child as it is expelled, and carrying it forwards towards the legs of the mother, allowing it perfect liberty to change its position, or make such turns as the mechanism may impress upon it. It will rarely, if ever, be necessary for us to attempt to adapt the child to the passages, as we have seen that even when the head is in an apparently unfavourable position at the brim, it rectifies itself in the cavity. What we must do, is to offer no impediment to these changes.

When the umbilicus appears at the external orifice, the danger from pressure on the funis commences; the cord should be drawn down a little, and removed as much as possible out of the way of pressure. The strength of the pulsations is an important guide as to the necessity for assistance; if they be strong, we can allow a little time for the natural powers to act; if, on the contrary, they be very weak, we must expedite the delivery as much as possible, consistent with the safety of the mother, by drawing down the body of the child during a pain.

When the chest is through the external parts, the arms may offer a difficulty; if they be close to the side of the child, we shall have no trouble, but if above the side of the head they must be brought down by passing one or two fingers over the shoulder as near as possible to the elbow, and then drawing the arm across the face and chest until the elbow arrives at the external orifice: having extracted one, the other is easily liberated, and it is generally easier to begin with the one nearest the perineum. Great care must be taken not to draw directly downwards, or we may break the arm, but across the front of the child, and neither violently nor suddenly, or much mischief may be done to the soft passages.

When the arms are free, the shoulders will pass out, and the head of the child will take up its position at the brim and in the cavity in the manner described; but here there is a considerable delay. If there be no demand for prompt delivery, and the cord pulsate strongly, it is better not to interfere until the head is in the cavity, when two fingers of the left hand may be introduced and placed in the mouth, or, what is better, on the upper jaw, which, for many reasons, is more suitable than the lower, as usually recommended, and pressure made so as to depress the chin upon the breast; thus presenting a shorter diameter of the head to the lower outlet, and facilitating the expulsion of the head. The body of the child should be carried forward quite to the thighs of the mother, and extracting force, varying in amount according to the exigency of the case, applied to the shoulders, in the direction of the axis of the lower outlet. "In some few cases," Dr. Collins says, "advantage is derived from pushing up the head a little so as to alter its position." This manœuvre, when dexterously executed, will generally extricate the head with ease and promptitude, if the patient have had children. In these cases it is peculiarly necessary that pressure should be applied over the uterus from the time that the chest is expelled, in order to secure the regular expulsion of the afterbirth.

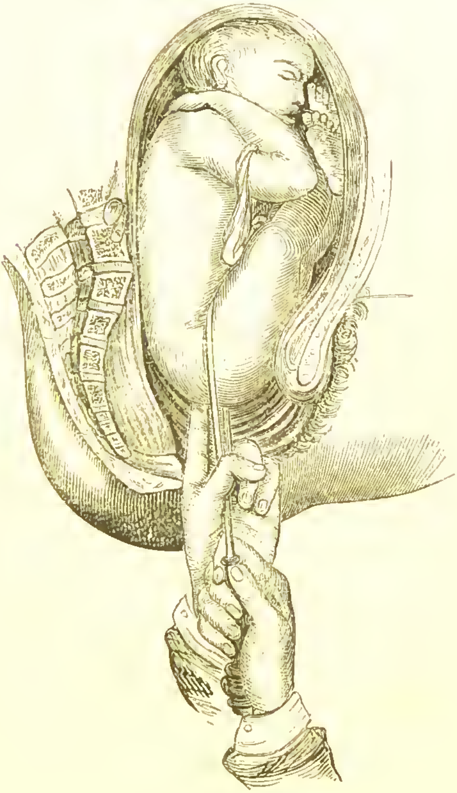
Fig. 110.



(*From Moreau.*)

But if the uterine power should fail (as in powerless labour), or any circumstances demand speedy delivery before the breech is expelled, one or two fingers should be passed into the groin, and assistance gently and steadily afforded during a pain. The blunt hook may be used for this purpose, but it must be used cautiously, or the thigh of the child may be fractured. After the breech is born, we may extract by grasping the body of the child, covered with a napkin; and let me impress upon my junior readers, that

Fig. 111.

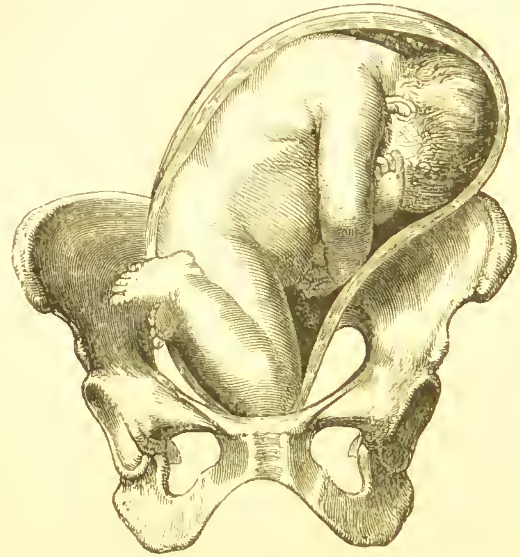


(*From Dr. Hodges.*)

extracting force, to be successful (not to say safe) must always be made in the axis of the brim or outlet, at whichever part the resistance may be.

In some cases, however, the head is not so easily extracted, and I perfectly agree with Dr. Collins, that "should there be any considerable obstruction to the getting away of the head, we are by no means justified in using violence; the soft parts of the mother will be sure to suffer from such a mode of proceeding, and on the child's part, nothing is to be gained, as it is destroyed by pressure on the funis, continued during the time the ordinary efforts have been diligently but unsuccessfully employed for its

Fig. 112.



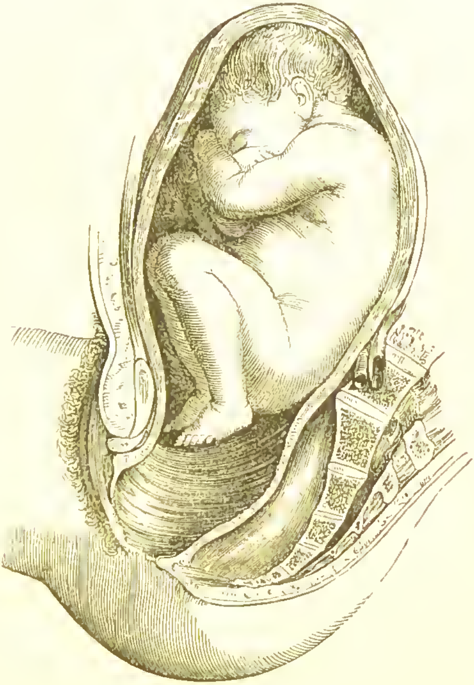
(*From Moreau.*)

delivery." If the pulsation in the cord have ceased, "the only safe plan under these circumstances will be to lessen the head by means of an opening made behind one or both ears." If the pulsation be good, it will be right to try the forceps, provided they can be introduced without difficulty; but we must remember that we cannot in these cases gain much space by compression, because we grasp the base of the skull.

2. Presentation of the Inferior Extremities.—Under this head I include presentations of one or both of the knees or feet, as the former are always converted into footling cases as the labour advances. In point of frequency they stand next to breech presentations.

Mechanism.—Adopting Naegelè's arrangement, we shall make but two divisions of this mal-presentation. 1. When the toes are directed backwards, and 2, when the toes are directed forwards. The former is the more frequent, and both correspond to the two classes of breech presentations.

Fig. 113.



(*From Moreau.*)

As we should expect, the feet, meeting with no resistance to fix them, are liable to change their position during their descent, until the hips enter the brim, which they do precisely as was described in breech cases. In fact, in its further progress the case is identical with breech cases, and the description already given will serve as well for footling cases, on which account I need not repeat it.

The expulsion of the body of the child may be more rapid, owing to the absence of the additional bulk of the thigh when doubled up on the abdomen, but it is just so much the less safe for the child.

STATISTICS.—*Frequency.*

a. *British and American Practice.*

Authors.	Total No. of Cases.	Pres. of Infr. Ex.
Dr. Bland	1,897	18
Dr. Jos. Clarke	10,387	184
Dr. Granville	610	3
Dr. Merriman	2,947	40
Ed. Lying-in Hos.	2,452	8
Mr. Gregory	691	7
Dr. Maunsell	839	21
Dr. Beatty	1,182	15
Dr. Collins	16,414	187
Dr. Lever	4,666	29
Mr. French	89	1
Dr. Churchill	1,525	22
Drs. M'Clintock & Hardy	6,634	38
Dr. Murphy	467	6
Dr. Storer	440	2
Mr. Crosse	1,394	6
Mr. Earle	4,320	40
Birmingham Hos.	650	2
Dr. Bliss	771	8
Dr. Metcalf	360	4
Mr. Rose	600	7
Mr. Bailey	2,819	29
Dr. Toogood	1,135	3
Dr. J. Lee	850	13
Dr. Copeland	1,290	10
Dr. Pagan	8,684	113
Mr. R. U. West	2,106	29
Mr. J. Thompson	3,300	8
Drs. Johnston and Sinclair	13,748	181
Dr. Hall Davis	13,728	81
Mr. Harrisson	1,000	13
Dr. Cross	4,733	56
Mr. Smart	5,026	62
Dr. Lawrence	1,000	4
Mr. Dunn	3,281	3
Dr. Steele	5,310	46

b. *French and Italian Practice.*

Authors.	Total No. of Cases.	Presentation of Inferior Extremities.
Mad. Boivin	20,517	242
Mad. Lachapelle	15,652	247
M. Rambonx	501	3
Dr. de Belli	2,739	32

c. *German Practice.*

Authors.	Total No. of Cases.	Pres. of Infr. Ex.	Authors.	Total No. of Cases.	Pres. of Infr. Ex.
Moschner and Kursak	12,329	82	Dr. Klugè	1,074	17
			Dr. Brunatti	295	3
M. Richter	2,571	30	Dr. Theys	21	2
A. E. v. Siebold	2,059	25	Dr. Adelmann	53	2
E. C. v. Siebold	947	11	Dr. Arneth	6,608	59
Dr. Kilian	2,350	8	Prof. Schwerer	21,804	119
Dr. Carus	2,908	23			

Thus, in British practice, we have 120,525 cases, and 1156 presentations of the inferior extremities, or about 1 in $104\frac{1}{3}$.

In French practice, 45,409 cases, and 524 presentations of the inferior extremities, or about 1 in $86\frac{3}{4}$.

In German practice, 53,019 cases, and 372 presentations of the inferior extremities, or about 1 in $142\frac{1}{2}$.

Altogether 218,953 cases, and 2052 foot or knee presentations, or about 1 in $106\frac{1}{2}$.

The following table shows the mortality among the children:—

Authors.	Footling Cases.	Children lost.	Authors.	Footling Cases.	Children lost.
Mr. Giffard.	23	13	Dr. Beatty	15	10
Dr. Smellie	9	3	Dr. Collins	187	73
Mr. Perfect	11	6	Dr. Lever	29	16
Dr. Jos. Clark	184	62	Dr. Churchill	22	10
Dr. Ramsbotham	2	1	Drs. M'Clintock & Hardy	25	5
Dr. Merriman	40	6			
Edin. Hospital	8	2	Mr. J. Thompson	8	0
Dr. Arneth	59	11	Drs. Johnston and Sinclair	127	59
Dr. Metcalf	4	2			
Dr. Murphy	6	1	Dr. Hall Davis	81	26
Dr. Storer	2	2	Mr. Smart	62	29
Mr. Gregory	7	3	Dr. Lawrence	4	3

This gives a very large mortality, 311 children being lost out of 849, or about 1 in $2\frac{2}{3}$.

Symptoms.—The first circumstance in the labour which excites our suspicion of its being unnatural, is very often the early rupture of the membranes, and the large quantity of liquor amnii which escapes, and, on making an examination, we discover the absence of the head blocking up the brim, although we may not be able to make out the presentation. As the labour advances, one or both of the feet or the knees descend through the os uteri, sometimes with the toes pointing downwards, but more frequently bent up towards the tibia. An examination at this period will enable us to form a diagnosis. The labour proceeds gradually, and the hips descend into the pelvis; then the chest, shoulders, and head, precisely as described in breech presentations, and with the same evolutions and adaptations.

Danger to the mother can only arise from a prolongation of the second stage, or injury to the passages, and there is little risk of either so long as violent efforts be not made to extricate the child, and if the pelvis be well formed.

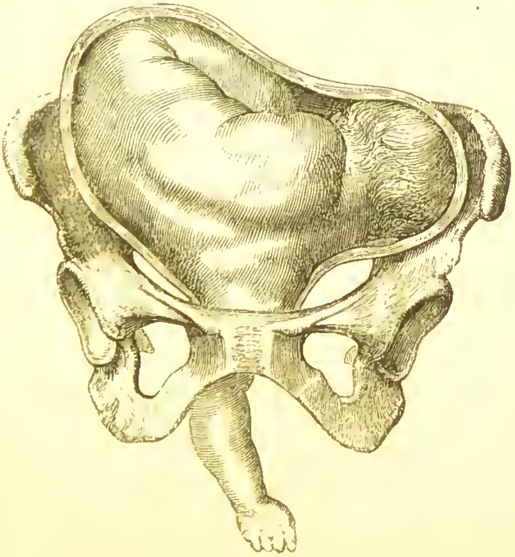
The danger to the child is greater than in breech presentations, one in two and a half being lost, and from precisely the same cause which made the latter more dangerous than head presentation—viz., the inadequate dilatation of the passages. The child passes through as a wedge, and each succeeding part being wider than the preceding, has to effect dilatation sufficient for itself, and that at a stage when time is of great value from the pressure to which the child is exposed. The breech, with the legs turned up, is less bulky than the head, and therefore prepares badly for the quick transit of the latter; but if the size of the breech be diminished by the thighs being extended, it is clear that much greater resistance and delay of the head will result: and in this greater delay and consequent prolongation of the pressure upon the funis is the explanation of the increased mortality.

Diagnosis.—Footling presentations, when high up in the pelvis, may be confounded with presentations of the hand; and if one foot only be down, the heel may be mistaken for an elbow. However, a little care will enable us to distinguish them. For instance, the foot is longer and the sole flatter than the hand; the toes are shorter, and more equal in length than the fingers, and the great toe does not separate from the others, as the thumb does from the fingers. The presence of the heel, with the ankle-bone on each side, is quite different from the hand and wrist. Tracing from the heel along the sole of the foot to the toes will, of course, distinguish the heel from the elbow. In an examination, the knee may be distinguished from the elbow, for which it may in some degree be mistaken, Naegelè remarks, in that it is thicker, that it has two prominences, and a depression between them; while, on the other hand, the elbow, which is thinner, presents to the feel between the two prominences a projection in which it seems to end.

TREATMENT.—In every particular, the treatment of breech presentations applies to footling cases, except that I think there is rather more temptation to pull down the child at an early period, because of the greater facility for so doing; but, from what I have said, it must be evident that it is more necessary that the labour should be let alone. There can be no occasion to interfere until the pressure upon the funis is felt, *i.e.*, until the umbilicus is visible, and then the risk to the child must decide upon whether assistance is to be given or not. The same method must be adopted for extricating the arms, and for facilitating the expulsion of the head: and in the more difficult cases we have the same remedies at command.

3. PRESENTATION OF THE SUPERIOR EXTREMITIES.—In almost all cases of this kind it is the shoulder which primarily presents,

Fig. 114.

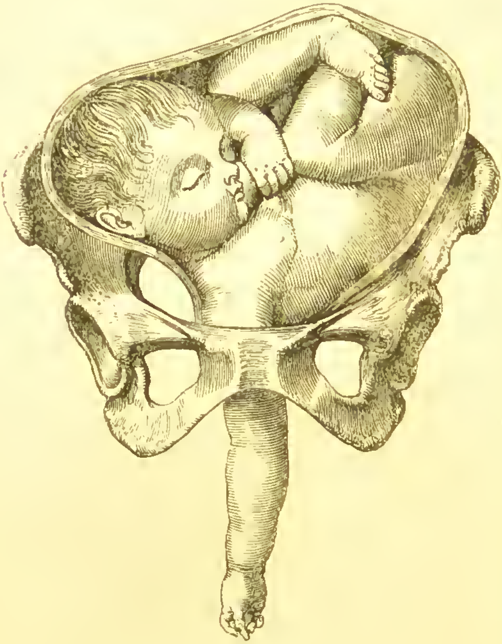


(*From Moreau.*)

and afterwards the arm prolapses; occasionally, however, we find the hand at the beginning of the labour at the os uteri, and more rarely the elbow.

In all cases the back of the child either looks forward towards the abdomen of the mother (fig. 114), or backward towards her spine (fig. 115): the former being twice as frequent as the latter.

Fig. 115.



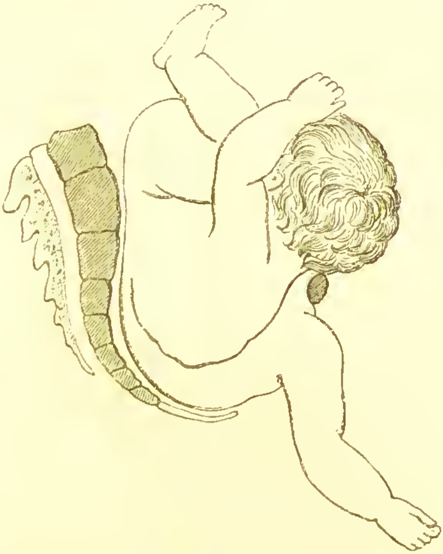
(*From Moreau.*)

In the majority of cases, with such a position of the child, labour may be considered as impracticable, unless assisted by art; and yet even with such an untoward position, the natural powers have occasionally succeeded in expelling the child. Dr. Denman, in 1772, first noticed the fact, and he supposed that, during an interval of uterine relaxation, the shoulder and arm receded, and the breech came down into the pelvis; hence the name he gave to it, "*spontaneous evolution of the fœtus.*"

This explanation of the process, which I hastily attributed to a mistake on Denman's part in a former edition, has, however, been confirmed by other observers—for example, M. Boer, Dr. Mitchell,* Dr. Dyce,† Mr. Crosse,‡ and Mr. Heslop.§

That there is another and more common mode in which the evolution takes place is certain, for I have seen it from beginning to end, and for the true explanation of which we are indebted to the accurate observation and ingenuity of my friend, the late Dr. Douglas, a distinguished practitioner of this city, in an essay published in 1811, from which the following short description is extracted. Before its expulsion, the situation of the fœtus "resembles the larger segment of a circle; the head rests on the pubis internally, the clavicle presses against the pubis externally, with the acromion stretching towards the mons veneris (fig. 116): the arm and shoulder are entirely protruded, with one side of the

Fig. 116.



(*From Chailly.*)

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* Charleston Med. Journ., May, 1850.

† Edin. Monthly Journal, May, 1850, p. 437.

‡ Cases in Midwifery, p. 105.

§ Med. Times and Gaz., June 8, 1861.

thorax not only appearing at the os externum, but partly without it: the lower part of the same side of the trunk presses on the perineum, with the breech either in the hollow of the sacrum or

Fig. 117.

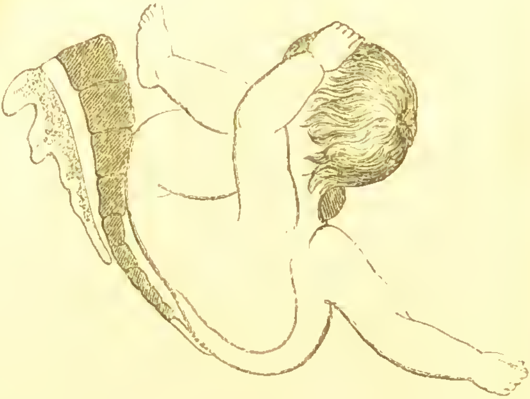
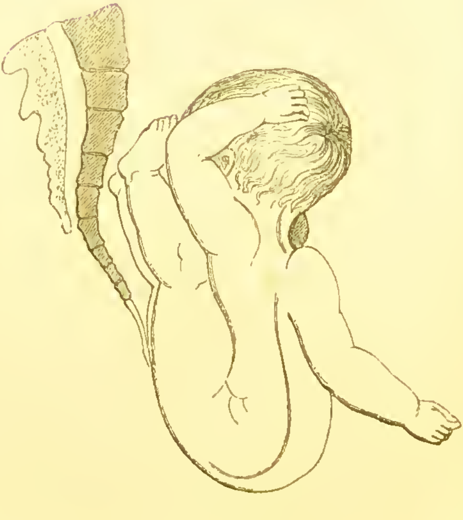


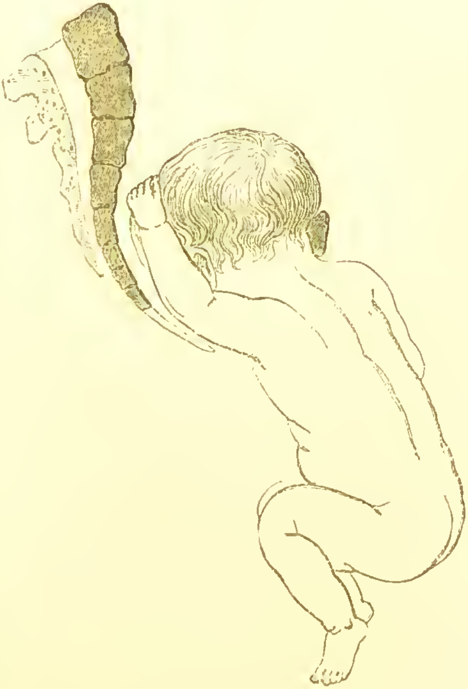
Fig. 118.



(*From Chailly.*)

at the brim of the pelvis, ready to descend into it (fig. 117); and by a few further uterine efforts the remainder of the trunk, with the lower extremities, is expelled (fig. 118.) And, to be more minutely explanatory of this ultimate stage of the process, I have to state that the breech is not expelled exactly sideways, as the upper part of the trunk had previously been; for, during the progress of that pain by which the evolution is completed, there is a twist made, about the centre of the curve, at the lumbar vertebræ, when both buttocks, instead of the side of one of them, are thrown against the perineum, distending it very much; and immediately after the breech, with the lower extremities, issues forth; the upper and back part of it appearing first, as if the back of the child had originally formed the convex, and its front the concave side of the curve."

Fig. 119.



(*From Chailly.*)

Thus the head and the shoulder depressed in the pelvis are fixed, and the remainder of the body doubled up, is, inch by inch, forced into the pelvis, and through the external parts, until all below the arm is expelled, leaving the case to be terminated as a breech or foot presentation (fig. 119). At no part of the process is the arm at all retracted; but if moved at all, it is still further protruded: the name of "spontaneous expulsion," given by Dr. Douglas, is therefore more suitable than that of "spontaneous evolution." An essential condition of this extraordinary effort of nature, is the relative disproportion of the fœtus and pelvis; either the fœtus must be smaller, or the pelvis larger than usual, to permit it. The accuracy of Dr. Douglas's explanation has been proved by the observations of Dr. Gooch and others. I can also add my testimony, having some years ago had an opportunity of witnessing the entire process.

It sometimes happens in arm presentations, when the child is small and the pelvis large, and especially with premature births, that the child is expelled doubled. Dr. Dyce describes a case in which the shoulder and buttocks were brought down nearly together, the arch formed by tho body looking downwards.*

I have seen the reverse more than once, and I think it is the more common, *i.e.*, where the body doubled is protruded, the extremities, back, and head being above.

There is a third mode of transmission, if the child be unusually small, or the pelvis unusually large, or both; and that is by the head being pressed against the shoulder or chest, and the child driven through, doubled. In a premature case I have seen the child doubled in the middle, and so expelled. My learned friend Dr. Christie, of Aberdeen, has published a very interesting paper upon this subject.†

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* Ed. Monthly Journal, May, 1850, p. 433.

† Ed. Medical Journal, July, 1864, p. 26.

STATISTICS.—*Frequency.*

a. *British Practice.*

Authors.	Total No. of Cases.	Pres. of Sup. Ex.
Dr. Bland . .	1,897	8
Dr. Jos. Clarke .	13,387	48
Dr. Merriman .	2,947	19
Dr. Granville .	640	1
Ed. Lying-in Hos.	2,452	4
Dr. Collins . .	16,414	40
Mr. Gregory. .	694	4
Dr. Cusack . .	701	5
Dr. Maunsell .	839	4
Dr. Beatty . .	1,182	4
Dr. Lever . .	4,666	12
Mr. Mantell . .	2,510	4
Dr. Churchill .	1,525	9
Drs. M'Clintock and Hardy	6,634	26
Dr. Reid . . .	5,691	29
Birmingham Hos.	650	4
Dr. Murphy . .	467	2
Dr. Copeland .	1,290	4
Mr. Crosse . .	1,394	3
Mr. Earle . .	4,320	34
Mr. Rose . . .	600	3
Mr. Bailey . .	2,819	7

a. *British Practice.*

Authors.	Total No. of Cases.	Pres. of Sup. Ex.
Dr. Toogood . .	1,135	3
Dr. J. Lee . .	850	3
Mr. K. Watson .	800	11
Mr. J. Thompson	3,300	5
Drs. Johnston and Sinclair	13,748	60
Dr. Hall Davis .	13,786	36
Dr. R. U. West .	2,106	8
Mr. Harrisson .	1,000	1
Dr. Cross . .	4,733	30
Mr. Smart . .	5,026	26
Dr. Lawrence .	1,000	2
Mr. Bailey . .	6,476	44
Dr. Steele . .	5,310	20

b. *French Practice.*

Authors.	Total No. of Cases.	Pres. of Sup. Ex.
Mad. Boivin . .	20,517	80
Mad. Lachapelle	15,652	68
M. Ramboux .	491	4
Dr. de Belli . .	2,739	37
Wurtzburg Hos.	637	3

Thus, in British practice it occurred 517 times in 125,670 cases, or about 1 in 243; and in French practice 192 times in 40,036 cases, or about 1 in 208½. Altogether 709 times in 166,436 cases, or about 1 in 234¾.

Authors.	Presentation of Superior Extremities.	Mothers lost.	Children lost.	Delivered by	
				Version.	Crotchet
Mr. Giffard	24	0	15	21	
Dr. Smellie	34	3	19	28	
Mr. Perfect	6	1	2	6	
Dr. Jos. Clarke	48	6	21		
Dr. Ramsbotham	27	6	18	12	11
Dr. Merriman	19	...	2		
Edin. Hospital	4	...	2		
Dr. Collins	40	4	20		
Mr. Gregory	4	...	3		
Dr. Cusack	5	0	2	4	
Dr. Maunsell	4	...	4	2	
Dr. Beatty	4	1	4	4	
Mr. Lever	12	3	8		
Dr. Churchill	9	0	5	9	
Drs. Hardy & M'Clintock	26	2	...	19	4
Dr. Murphy	2	...	2		
Mr. J. Thompson	5	1	5		
Drs. Johnston and Sinclair	42	3	28	25	
Dr. Hall Davis	36	...	21	18	2
Dr. R. U. West	8	0	3	3	
Mr. Smart	26	1	14	24	
Dr. Lawrence	2	0	0	2	

The second of the preceding tables is intended to show the mortality to both mother and child, so far as it is mentioned by the author: where it has not been recorded, I have left the space blank; but if either died, I have so specified. I have thought it worth while, also, to add some columns showing the different modes of delivery practised.

From this record we find, that out of 361 cases of presentation of the superior extremities, 198 children were lost, or about one-half. Out of 282 cases, 30 mothers were lost, or nearly 1 in 9.

Symptoms.—Labour with this mal-presentation is, as the statistics show, extremely dangerous to the mother and child, and especially as the remedy involves a very serious operation. Dr. Rigby has given a graphic picture of a case of this kind when unassisted: "After the membranes have burst, and discharged more liquor amnii than in general when the head or nates presents, the uterus contracts tighter around the child, and the shoulder is gradually pressed deeper in the pelvis, while the pains increase considerably in violence from the child being unable, from its faulty position, to yield to the expulsive efforts of nature. Drained of its liquor amnii, the uterus remains in its state of contraction even during the intervals of the pains; the consequence of this general and continued pressure is, that the child is destroyed from the circulation in the placenta being interrupted, the mother becomes exhausted, and inflammation or rupture of the uterus and vagina are the almost unavoidable results."

On the part of the mother, so long as the labour is virtually in the first stage, the symptoms are perfectly natural and favourable; but after the second stage (marked by voluntary effort and change of cry) has lasted for some time, then we have in detail the symptoms of powerless labour, exactly as I have described them; but with a difference in the results, owing to the mechanical obstructions offered by the mal-position of the child; and I regard these cases as the most striking illustration of the fact I have repeatedly pressed upon the reader's attention—viz., that the development of unfavourable symptoms is owing to the stage at which the delay occurs, and not to the kind of impediment; for here we find that the same symptoms arise from a purely mechanical impediment on the part of the child, the uterine system being in perfect integrity, as we found to result from inefficient pains, from tumours in the soft passages, or from deformity of the pelvis.

Diagnosis.—Our first suspicion will probably arise from finding, on examination, that we are not able to reach the presentation: this, of course, proves nothing; but it ought to induce a very careful investigation, and we may find the os uteri very little dilated; and suffering comparatively little pressure during each pain, or the hand may be felt protruding through the undilated os uteri. The high situation of the presentation (if it be the shoulder) renders it difficult to ascertain the part which is descending. We may derive confirmation of our suspicions from finding the bag of the membranes protruding, of a conical or elongated form, and evidently not covering the head.

When the shoulder has descended a little, we may be able to reach the axilla, and we shall find that the shoulder is rounder than the elbow, and has not the condyles of the humerus, so that this will decide the point for us.

The hand may be mistaken for the foot; but its shortness, the length of the fingers, and the divarication of the thumb, will enable us to distinguish it. The situation of the thumb, and the aspect of the palm of the hand, will mark whether it is the right hand or the left.

Causes.—This mal-presentation has been attributed to irregular early contractions of the uterus, to irregular distension, to obliquity, &c. &c. They may possibly have some such effect; but I think all the explanations as yet offered are insufficient. Dr. Rigby concludes:—"We may, therefore, state that the causes of arm or shoulder presentations are of two kinds—viz., when the uterus has been distended by an unusual quantity of liquor amnii, or when, from a faulty condition of the early pains of labour, its form has been altered, and with it the position of the child."

Treatment.—As (with very few exceptions) the labour is impracticable, we have nothing to expect from the natural efforts, except an increase of difficulty, it becomes our duty to interfere promptly in every case. Should the mal-presentation have been detected before the rupture of the membranes, and before the os uteri is fully dilated, we may wait for a time to allow of as complete dilatation as possible; nor is there any risk so long as the membranes are entire. But if they have given way, we ought not, and if the os uteri be fully dilated (whether the membranes be entire or not) we must not wait a moment, but proceed to deliver by turning. When the liquor amnii has not escaped, there is seldom any difficulty; but after that event, we generally find the uterus more or less strongly contracted upon the child, and in proportion to this contraction is the difficulty. If the uterine action be very intense, the operation may be impossible without risk of rupturing the uterus; and in such cases, instead of proceeding at once to turn, a dose of tartar emetic or opium, or a combination of both, may be given, so as to moderate or suspend uterine action, and admit of the introduction of the hand. If the pulse be quick and strong, venesection may be beneficial. I have already given the details of the operation of turning.

Should these measures fail, and version be impracticable, we must open the chest of the child, and eviscerate; after which it may be extracted by the crotchet. "Several writers," says Dr. Collins, "recommend, in difficult cases of this nature, the separation of the child's head, so as to bring the body away by the presenting arm, and afterwards deliver the head by the crotchet: this we would condemn, unless we failed in our efforts, by breaking down the thorax, which is very unlikely, if the operation be properly performed, and the pelvis not extremely under size.

We once saw a delivery effected as above described, and the greatest difficulty was experienced in the extraction of the head; it was necessary to introduce the hand to bring it into the vagina, and then it had to be lessened before it could be removed."

But, it will at once be asked, what practical application can be made of our knowledge of the occurrence of spontaneous expulsion? I am afraid not much. I am satisfied that we ought not to wait for it in any case in which turning can be accomplished, because, if it did not occur (and, according to Dr. Douglas, it does not occur above once in ten thousand labours), the operation will be rendered tenfold more difficult, from the greater depression of the child, and more energetic action of the uterus; it would, in fact, be exchanging a comparatively easy and not very dangerous operation for a very difficult one, in which the risk to the mother would be great, and the death of the child certain, provided this rare phenomenon did not occur. I think, however, that in such a case as Dr. Douglas has described, we may venture upon a little delay, to afford a chance of spontaneous expulsion. "If the arm of the fœtus," says Dr. Douglas, "should be almost entirely protruded, with the shoulder pressing on the perineum; if a considerable portion of its thorax be in the hollow of the sacrum, with the axilla low in the pelvis; if, with this disposition, the uterine efforts be still powerful, and if the thorax be forced sensibly lower during the pressure of each successive pain, the evolution may with great confidence be expected."

As the minute details of management are the same in natural and unnatural labours, I have not thought it necessary to repeat them, but refer the reader to the chapter on that subject.

4. Compound Presentations.—From an untoward position of the body or extremities of the child, one or more parts may come together to the os uteri; in some cases merely adding to the bulk to be transmitted through the passages without altogether preventing it, in others rendering interference necessary for the delivery. For instance:—

1. *The hand or arm may present with the head,* of course adding to its size, and perhaps, if the pelvis be small, prohibiting its entrance into the passage. As a general rule, the hand or arm is stretched out or placed along the side of the head, descending with it or before it; but Sir James Simpson has met with a case in which the fore-arm was placed across the back of the head and neck, at once increasing the bulk and opposing a projecting obstruction which caught upon the brim of the pelvis. He brought the hand downwards and forwards; but the pains proving insuf-

ficient, and the child getting weak, he delivered by podalic version.* Nor is this compound presentation without danger if the uterine action be violent. Dr. James Gray has related a case in which the hand, presenting with the head, was forced through the walls of the vagina and rectum.† Such cases, however, are very rare. Compound presentations, as Dr. Merriman has observed, rarely occur except when the pelvis is large. In the cases recorded by Drs. Jos. Clarke, Collins, and Jansen, no example is mentioned; and in those of Mesdames Lachapelle and Boivin only three, *i.e.*, three cases in 75,903 deliveries. For which reason, if it be discovered early, a cautious attempt should be made to replace the arm above the head, so as to allow it to descend; but, above all things, we must be cautious neither to draw down the hand nor to displace the head, as either may convert a simple manageable case into an arm presentation.

If the arm cannot be replaced, the case must then be treated as one of relative disproportion; perhaps a little time and extra uterine action (which is generally exerted, as we have said, in proportion to the demand for it) may suffice: if not, and the delay should excite unfavourable symptoms, we must first see if the forceps are applicable, or version, and, as a last resource, if all others fail, we must lessen the head. I prefer the forceps to version, because of its inferior mortality as regards both mother and child; and version (when possible) to the crotchet, for the same reason.

2. *The feet and hands may present*, or one of each, and in these cases it not unfrequently happens that the cord prolapses (fig. 120) from the upper outlet not being filled by the presenting part.

In such cases, it is evident that one or the other extremity must descend and give the character to the labour, making it an arm or footling case.

Now it is exactly for the determination of this question that we ought to interfere. There can be no doubt of the propriety of drawing down the foot or feet into the pelvis so as to preclude the possibility of the arm descending, and when this is done, the case is one of footling presentation, and to be managed accordingly. But I must repeat my caution that the greatest care is necessary, first, not to mistake a hand for a foot, and, secondly, not to favour the descent of the hand and arm by the mode of examining.

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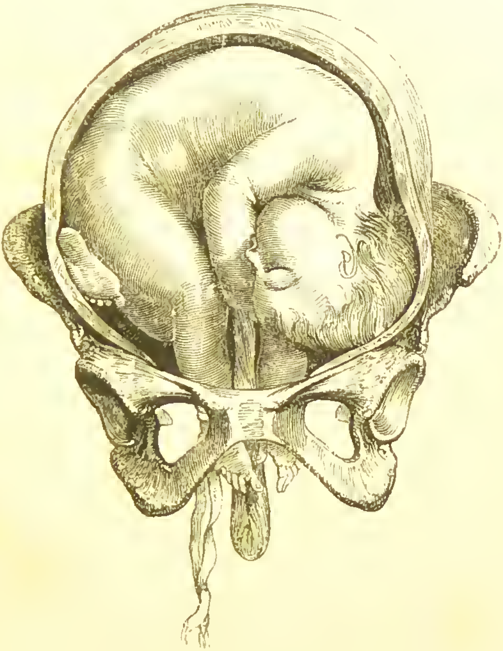
* Ranking's Abstract, vol. ii. p. 263.

† Edinburgh Monthly Journal, Jan. 1851.

Prolapse of the cord increases the danger to the child, and ay (according to the rules laid down) require us to hasten the

Fig. 120.



(*From Dr. Ramsbotham.*)

labour, if the pulsations be weak and the woman have previously had children.

CHAPTER XVII.

PARTURITION.—CLASS II. UNNATURAL LABOUR. ORDER 6. PLURAL BIRTHS.—MONSTERS.

1. Plural Births.—I have already stated the signs by which twin pregnancy is to be recognised, and also that in the majority of cases they are very dubious. Each child possesses its special envelopes and a separate placenta, though they are sometimes so pressed together as to appear but one, and occasionally a vascular communication passes from the one to the other.

Dr. Spaeth of Vienna, in 126 cases of twin pregnancy found that in 49 each had distinct placenta, chorion and amnion.

In 46 cases, the placentæ were united, but each pelvis had a distinct chorion and amnion.

In 28 cases, the placentæ were united, and there was a single chorion, but each fœtus had a separate amnion.

In two cases, the placentæ were united, and there was a single chorion and amnion.*

The labour is often premature, and the children are generally smaller than usual.

The mode of transmission of each child may be perfectly natural, or either or both may come under some of the orders of unnatural labour already described, requiring the management suitable for such cases: so far, a separate notice of plural births is unnecessary: but on the other hand, there are some important points of practice, and some details as to the presentation and mortality in such cases, which require to be investigated. In this chapter, therefore, I shall chiefly remark upon the circumstances peculiar to plural births, and, to avoid repetition, refer to the previous sections for the ordinary treatment.

A woman may conceive of two, three, four, or five children, but I am not aware of more than four children having been born alive at one birth.

The statistics I have been able to collect are not very extensive, but there are some interesting points which I have endeavoured to investigate as fully as the means permit.

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* Association Journal, Sept. 8, 1860, p. 709.

STATISTICS.—1. *Frequency.*

a. *British Practice.*

Authors.	Total No. of Cases.	Twins.	Triplets.	Quadruplets.
Dr. Jos. Clarke .	10,307	184	3	1
Dr. Merriman . .	2,947	39	1	
Dr. Granville . .	640	9		
Edinburgh Hospital	2,452	31	2	
Dublin Hospital .	129,172	2,062	29	1
Dr. Maunsell . .	839	13		
Mr. Gregory . .	691	12		
Dr. Beatty . . .	1,182	18		
Dr. Lever . . .	4,666	33		
Dr. Reid . . .	580	9		
Mr. Warrington .	110	3		
Dr. Churchill . .	1,640	25	1	
Drs. M'Clintock and Hardy .	6,634	95	1	
Dr. F. Ramsbotham	48,996	536	3	
Dr. Murphy . .	467	3		
Dr. Storer . . .	451	5		
Mr. Crosse . . .	1,394	17		
Mr. Earle . . .	4,320	53		
Mr. Rose . . .	600	10		
Mr. Waddington .	2,159	19	1	
Dr. Toogood . .	1,135	12		
Dr. J. Lee . . .	850	9		
Mr. K. Watson .	800	18		
Dr. Copeland . .	1,290	9		
Dr. Adams . . .	628	10	1	
Dr. Pagan . . .	8,587	95	1	
Mr. R. U. West .	2,106	23		
Mr. J. Thompson .	3,300	25		
Drs. Johnston and Sinclair . .	13,748	233	1	
Dr. Hall Davis .	13,916	133		
Mr. Harrisson . .	1,000	10		
Dr. Cross . . .	4,733	61	1	
Mr. Swift . . .	5,026	72		
Mr. Bailey . . .	6,476	52	1	
Dr. Lawrence . .	1,000	17		
Dr. Steele (Guy's) .	5,254	52	2	

b. *French Practice.*

Authors.	Total No. of Cases.	Twins.	Triplets.	Quadruplets.
Mad. Boivin . .	20,357	154	3	
Mad. Lachapelle .	15,481	165	3	
Hôtel Dieu, Paris .	280	4		
M. Mazzoni . . .	452	9		
Dr. de Belli . .	2,739	34		

c. *German Practice.*

Authors.	Total No. of Cases.	Twins.	Triplets.	Quadruplets.
Dr. Henne . . .	1,214	1		
Dr. Richter . . .	2,571	52		
Moschner & Kursak	12,329	165		
A. E. v. Siebold .	1,409	20		
Dr. Riecke . . .	219,303	2,545	34	2
Dr. Klugè . . .	809	15		
Prof. Andrée . .	176	5		
Dr. Theys . . .	55	4		
Dr. Brunatti . .	99	2		
Dr. Adelmann . .	56	1		
Dr. Jansen . . .	13,365	157	1	
Dr. Hoffman . .	6,139	98		
Dr. Klein . . .	35,084	325		
Dr. Bartsch . . .	4,383	42		
Prof. Schwerer . .	21,804	250	1	
Dr. Arneth . . .	6,527	81		
Gebärklinik . . .	39,121	445	3	
Wurtzburg Hosp. .	637	31		
Moscow Hospital .	45,162	846	11	

So far as these numbers go, we find among British practitioners, in 285,219 cases, 3718 cases of twins, or about 1 in $76\frac{1}{2}$; and 43 cases of triplets, or 1 in 6000. Among French practitioners, in 39,409 cases, 336 cases of twins, or about 1 in 108; and 6 of triplets, or 1 in 6568. Among German practitioners, n 414,242 cases, 5085 cases of twins, or about 1 in $81\frac{1}{2}$, and 49 of triplets, or about 1 in 8454. Taking the whole, we have 738,870 cases, and 9139 of twins, or 1 in $80\frac{2}{3}$; and 102 cases of triplets, or 1 in 7271.

I have formerly quoted the comparative frequency in different countries stated by M. Quetelet.

2. *Mortality.*

Authors.	Twin Cases.	Children Lost.	Triplet Cases.	Children Lost.
Mr. Giffard	14	9	1	
Dr. Smellie	8	2	2	
Mr. Perfect	7	7		
Dr. Jos. Clarke	184	282	3	
Dr. Ramsbotham	15	9	2	4
Dr. Granville	9	4		
Dr. Collins	240	58	4	4
Mr. Gregory	12	16		
Dr. Beatty	18	8		
Dr. Lever	33	6		
Dr. Jansen	157	16		
Drs. M'Clintock and Hardy	95	19		
Dr. Arneth	81	8		
Dr. Hoffman	98	38		
Mr. J. Thompson	25			
Drs. Johnston and Sinclair .	233	85		
Dr. Hall Davis	69	9		
Mr. Harrisson	10	3		
Mr. Lawrence	17	1		

Thus, out of 1325 cases of twins (*i.e.*, 2650 children), 645 were lost, or about 1 in 4; and out of 12 cases of triplets (*i.e.*, 36 children), 11 were lost, or 1 in 3.

This mortality, however, which is very large, must be qualified by allowing for the great number of children whose death could not be attributed to the labour. Dr. Jos. Clarke had 43 stillborn; Dr. Collins had 54 premature labours among the twin cases, and 12 cases of the birth of a putrid fœtus. Drs. Johnston and Sinclair record 27 cases of putrid fœtus.

The mortality to the mother in twin cases has been computed as 1 in 20: in Dr. Collins' cases it was 1 in 34; in Drs. Johnston and Sinclair's it was 1 in 23. I regret that, from the imperfection of the records, I cannot give ample statistics on this point.

As to the sexes in twin cases, the following cases are recorded:—

Authors.	No. of Twin Cases.	Both Males.	Both Females.	One Male and one Female.
Dr. Jos. Clarke	184	47	68	71
Dr. Collins	240	73	67	97
Dr. Lever	33	11	11	11
Dr. F. Ramsbotham . .	536	171	183	182
Drs. M'Clintock & Hardy .	95	38	22	35
Drs. Johnston and Sinclair	233	76	58	99
	1,321	416	409	495

Thus we find that twin children are most frequently of opposite sexes, and that twin males are more common than twin females. From Dr. Collins' record, I may state, that of his twin male cases 23 were dead (1 putrid), and that of these 23, 13 were the first-born children; of the female twins, 11 were dead (4 putrid); and of the twins of opposite sexes, 22 were lost (7 putrid), of which 15 were boys and 7 girls. Drs. M'Clintock and Hardy state that "of the 190 children, 171 were born alive; viz., 85 first-born, and 86 second-born. Of the entire number of children, 111 were boys, of whom 58 were first-born, and 53 second-born; 79 were girls, of whom 37 were first-born, and 42 second-born; 101 boys were born alive, viz., 52 first-born, and 49 second-born; 70 girls were born alive, viz., 33 first-born, and 37 second-born; 10 boys were dead born, viz., 6 first-born, and 4 second-born; 9 girls were dead born, viz., 4 first-born, and 5 second-born; 5 of these females were putrid."* Of Drs. Johnston and Sinclair's 232 cases in 466 children, in 76 cases both were boys; 133 were born alive, 14 still-born, and 5 putrid; in 58 cases, both were females, 106 were born living, 6 dead, and 4 putrid. In 99 cases they were of opposite sex; 85 of the male children were alive, 9 dead, and 5 putrid; 89 of the girls were alive, 6 dead, and 4 putrid.† This is important, since from it we learn that there is more danger to the boys than the girls, and particularly when there are twin cases of opposite sexes.

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* On Midwifery and Puerperal Diseases, p. 329.

† Practical Midwifery, pp. 273-4.

From the reports of the same authors, the presentations, placed in order of birth, were as follows :—

Authors.	Both Head.	Head and Breech.	Head and Foot.	Both Breech.	Breech and Head.	Breech and Foot.	Both Footling.
Dr. J. Clarke .	16	...	25	2	6	1	3
Dr. Collins . .	103	30	25	8	25	9	5
Dr. Lever . .	15	7	5	2	...	1	
Drs. Johnston and Sinclair	125	44	...	19	26		

Authors.	Foot and Head.	Breech and Elbow.	Head & Arm or Shoulder	Face and Head.	Head and Face.	Foot and Hand	Foot and Breech.
Dr. J. Clarke .	10						
Dr. Collins . .	19	1	5	1	1	1	1
Dr. Lever . .	...	...	2				
Drs. Johnston and Sinclair	...	9	10				

Dr. Collins thus states the mortality of his different presentations: when both were head presentations, he lost 24 (4 putrid); when the head and breech (*i.e.*, the first child with the head, and the second with the breech) presented, 2 of the former, and 5 of the latter were lost; when the head and feet, 2 of the former and 3 of the latter; when the feet and head, 4 of the former and 2 of the latter; when the breech and the head, 1 of the former and 6 of the latter; when both were footling cases, 2 were lost; when the breech and feet, 3 of the former and 2 of the latter were lost.

This confirms what I have elsewhere stated, that the less the passages are dilated by the presenting part, the greater the mortality amongst the children, because of the delay in the transit of the remaining parts of the body of the child.

Sir James Simpson has investigated the subject of the alleged infecundity of the female in twin-births of males and females. He concludes, " 1. That in the human subject, females born co-twin with males are, when married, as likely to have children as any other females belonging to the general community. 2. That when they are married and become mothers, they are, in respect to the number of their children, as productive as other females. 3. That the same law of fecundity of the female in opposite-sexed twins seems to hold good among all our uniparous domestic animals, with the exception of the cow alone."*

Symptoms.—The first, second, or third child may present naturally or unnaturally, and in that respect the course of the labour will resemble that of similar cases with single children. But it is generally remarkable that the progress of the first child is slower than we should have expected; for, on examination, there appears no want of space, and the pains may be strong. This I suppose arises from the pressure of the entire uterus not bearing directly upon the child which is to pass first, but at least as much and primarily upon the second child. The pressure upon the second child causes it to press down the first child; but in this transmission of force much power is necessarily lost, and thus it is that we find very gradual progress in these cases, notwithstanding that the pains are good and the space ample. When the first child is born, whatever suspicions may have been previously entertained are changed into certainty, unless in the case of a small blighted fœtus; for, upon placing the hand upon the abdomen, the uterus is felt nearly as large as at first, and the child may be detected through its parietes.

After the birth of the first child, there is an interval of rest, varying from ten minutes to some hours; nay, instances are on record of days and weeks intervening before the birth of the second child. Of 212 cases related by Dr. Collins, in which the interval is accurately marked, in 38 it was 5 minutes; in 29, 10 minutes; 45, 15 minutes; in 23, 20 minutes; in 30 half an hour; in 5, three quarters of an hour; in 16, 1 hour; in 8, 2 hours; in 3, 3 hours; in 5, 4 hours; in 1, 4½ hours; in 3, 5 hours; in 2, 6 hours; in 1, 7 hours; in 1, 8 hours; in 1, 10 hours; and in 1, 20 hours. Thus in by far the larger number the uterine action was resumed within half an hour. Dr. Merriman refers to three remarkable cases: in one the second child was retained fourteen days after the first; in the second, it was retained six weeks; in the third case, the woman was delivered of twins, and two days afterwards of two more boys. Drs. M'Clintock and Hardy have noted that in 3 cases the interval was 5 minutes; in 9, 10 minutes; in 10, 15; in 11, 20; in 2, 25; in 13, 30; in 1, 40 minutes; in 4, 1 hour; in 3, 1½;

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* Ed. Med. and Surg. Journal, No. 158.

in 1, 2; and in 1, $2\frac{1}{2}$ hours. Drs. Johnston and Sinclair found that the average duration of labour when both twins were males was $10\frac{1}{3}$ hours, and for primiparæ, $14\frac{1}{2}$ hours; when both were female, $9\frac{4}{5}$ hours, in primiparæ, 14 hours; when male and female, a little more than 12 hours, with primiparæ, nearly $23\frac{1}{2}$ hours.

After this interval, whatever it may be, the pains return; and if there be nothing unusual on the part of the child, the labour is completed in less time than with the first child, because of the previous dilatation of the passages. For the same reason, when the second child presents with the breech or foot, the mortality is less than usual. Dr. Denman remarks, "the most fortunate presentation of the second child in a twin case is certainly with the inferior extremities, because it may in this position be extracted without injury or difficulty, and if assistance be required, this may be given with safety and convenience."

There is one important point to be borne in mind—viz., that the more quickly the two labours succeed each other, and the more rapidly they are terminated, the more probability there is of collapse afterwards, whether there be hæmorrhage or not. I have seen a lady placed in very great peril from this cause, without any unusual loss. I rather think, also, that there is more danger of hæmorrhage, but of that I am not quite certain. On this account the medical attendant should not leave the patient for some time after all is over.

TREATMENT.—Whether the first child present with the head or any other part, it is to be treated exactly according to the rules heretofore laid down, just as if it were a single birth; and so, as far as the labour is concerned, must the second child; thus, if the first be a natural labour, and the second a mal-presentation, we need not interfere with the first, but assistance may be necessary with the last child; or the first may be a mal-presentation requiring assistance, and the second a natural labour needing none. For the reason already stated, viz., the diminution of direct uterine force, it occasionally happens that the first child has to be delivered by the forceps. The rules laid down for the employment of that instrument apply equally to these cases, but it is even more necessary that no undue delay should take place.

So far we must act according to the nature of the case. But suppose that the uterus do not resume its action after the ordinary interval, are we still to leave all to nature? It is clear that, if the passages be allowed to recover from the former distension, there will be more trouble with the second child, especially if it be a mal-presentation; and that there must be a risk of hæmorrhage so long as the uterus remains uncontracted; and it would seem that delay involves danger to the second child. For these among other reasons, opinions have varied as to the necessity of interference, and as usual, the practice has ranged from one extreme to the other; some having advised instant delivery to obviate these dangers, and others, finding that in many cases left to nature no evil has followed, recommending that we should abstain from all interference. Dr. Denman advises us to wait for four hours, "if there be no cause for delivery sooner." Dr. Ramsbotham two or three hours, Dr. Burns about an hour. Dr. F. Ramsbotham agrees with Denman. Dr. Campbell suggests that ergot should be given before we attempt to extract the child. The rules laid down by Dr. Collins appear to me extremely judicious; he advises a middle course; "as soon as the first child is born, a binder should be applied so as to make gentle pressure upon the abdomen; we should not leave the house until the second child is delivered. If we find, after the lapse of half an hour, that the membranes of the second child still remain unbroken, they may be punctured with advantage, with the view of exciting uterine action, as the soft parts having been so well dilated by the passage of the first, no bad result can ensue. This expedient in some instances will be found not to succeed; and in such cases, when we do not observe any progress made in the course of two hours after rupturing the membranes, the best mode of proceeding will be to pass the hand cautiously into the uterus, and bring down the feet. There will be but little difficulty experienced in this operation, the parts being in so relaxed a state. When the head has made any considerable descent into the pelvis, the forceps will be the best means of affording assistance. It is very rarely, however, that we are called upon to effect delivery by either of the latter methods: yet experience has shown that the second child is very likely to be still-born, if left longer than two or three hours unassisted."

There are circumstances, as Dr. Merriman has justly observed, which would negative any delay in the delivery of the second child: as, for example, 1, when artificial aid has been required with the first child; 2, when the second child presents preternaturally; and 3, when the labour is complicated with convulsions, hæmorrhage, &c. Any deviation from normal labour with the second child is to be treated according to the rules laid down, without regard to its being a twin case.

With regard to the placenta of the first child; unless it come away quite easily, I believe that in all cases it is better to leave it until after the birth of the second child, as its removal might excite uncontrollable flooding. After the birth of the second (or third) child, the binder is to be tightened, and pressure or friction made upon the uterus, and when we find it disposed to contract, then we may draw down (in the axis of the upper outlet) first one cord, and if that do not yield, the other, or both together, so as to aid in the expulsion. But it must be remembered that, after the delivery of plural children, the uterus is less disposed to renew its exertions, and therefore a longer interval must be allowed: and that by the detachment of the placenta a much larger surface of bleeding vessels will be exposed, and therefore, that we should avoid their forcible separation by traction, and should be particularly careful to secure the due and permanent contraction of the uterus afterwards. It will probably be safer and wiser in these cases to give a moderate dose (ʒss.) of the ergot of rye immediately after the birth of the last child. "In twin cases," Dr. Collins observes, "when it becomes necessary to remove the placenta, we should be careful not to withdraw our hand from the uterus, until both be separated, at the same time waiting for uterine action, so as to induce as perfect a contraction of this organ as practicable: *a point of most vital importance.*" The shock of the nervous system is generally greater than after natural labour, and in some cases it is very severe, amounting to collapse, as in the case I have mentioned: this will justify the exhibition of stimulants and opium, and it demands extreme quiet and care.

The management of twin cases applies equally to triplet and quadruplet cases; especially the care recommended as to the placenta.

Dr. Denman states that "it is a constant rule to keep patients who have borne one child, ignorant of there being another, as long as it can possibly be done." There is certainly no occasion to frighten the patient by an abrupt communication; but, on the other hand, I do believe that concealments are bad, and that in midwifery, as everywhere else, "honesty is the best policy;" besides, the patient is almost certain to suspect the state of the case, and to inquire concerning it. I think, with Dr. F. Ramsbotham, that in all cases "it is better neither to inform her abruptly of the nature of the case, nor to make any mystery about it; but certainly to tell her that she will soon give birth to a second; and this may be coupled with a congratulation on the fortunate progress of the labour so far; and an assurance that she will have but little more pain to bear, and that the case presents no features calling for anxiety."

I have hitherto spoken of twin cases in which one of the children only presented; but it has occasionally happened that both bags of membranes have ruptured, and an extremity of different children descended, at the same time. Thus, the late Dr. Fergusson, of this city, has published a case in which the head of one child and the foot of another presented together. The midwife drew down the leg, and so jammed the head and breech in the pelvis together. However, the pains being powerful, expelled the natural presentation first, and the other afterwards. A similar case is recorded by Mr. Alexander,* and Mr. Allen relates one† in which the two heads occupied the pelvis together; and both were naturally expelled. Dr. Murphy‡ mentions a case in which the heads of twins were jammed in the pelvis together; and my friend Dr. Christie, of Aberdeen, has related to me a similar case, in which the feet of the first child presented, but the head of the second descended into the pelvis in advance of the head of the first. He succeeded, by pushing up the head of the first child, in liberating and pushing back the head of the second, after which the labour was speedily terminated. Dr. F. Ramsbotham mentions having been called to a case when a right and a left foot belonging to different children presented; he pushed up one and extracted by the other, and both children were born living.

Such cases are no doubt very puzzling at first, and may excite some anxiety as to the result; but it may be remarked, that the descent of a foot with the head proves that the pelvis is unusually large, and in all the cases it appears that the pains were very powerful. It would, therefore, be right, if we could not push up one of the presenting parts, to give fair play to the natural powers, and only upon conviction of their inefficiency to lessen the bulk of one child. If the head of the footling case were within reach, it would be better to operate upon it, as the child's life will have already been compromised by the pressure upon the cord, whilst the other child has incurred little or no danger. In such a case as Dr. F. Ramsbotham's, we must of course adopt a similar line of practice, pushing up one leg and drawing down the other, until the breech be engaged in the upper outlet.

II. Monsters.—All that is obstetrically important relating to this subject may be comprised in a few words. As far as we are concerned, we may divide all these deviations from normal formation into monstrosities by defect and excess, those from disease, and the cases where two children are conjoined. The only practical point involved is their relation in size to the pelvis; consequently with those by defect we have nothing to do, as there is no difficulty in their transit through the pelvis. Monsters from excessive development of different parts likewise come under the class of which we are treating, just so far as their bulk is rendered disproportionate to the pelvis.

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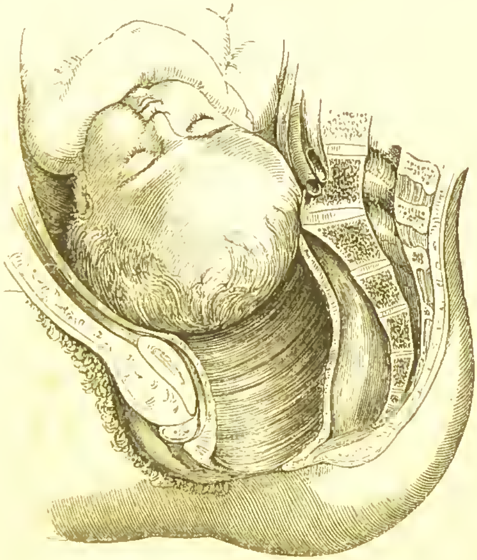
* Edin. Med. and Surg. Journal, 1822.

† Med.-Chir. Trans., vol. xii.

‡ Lectures on Parturition, &c., p. 274.

The principal diseases which render the child disproportionate to the passages are *hydrocephalus* and *ascites*. Neither are very uncommon, and most practitioners must have met with cases of them. When a child affected with hydrocephalus presents at the brim, the entrance may be effected with difficulty, or it may be quite impossible: the head being nearly incompressible. On examination, therefore, we find that, notwithstanding good pains, in well-marked cases, the head does not even dip into the pelvis; that no advance whatever is made by the uterine pressure (fig. 121). The head feels full and tense during a pain, but during an interval the fluid gives way under the point of the

Fig. 121.



finger. The bones of the head are unconnected, and give the impression of being loose in the scalp. If the labour were left to nature, we should, after due time, have all the bad symptoms of a prolonged second stage. The diagnosis is obscure: if we ascertain the pelvis to be of the usual size, and still find that the great bulk of the head is above the brim, and cannot descend, the case is clearly one of great disproportion, and it is equally plain that the excess is on the part of the child; in such circumstances, if the bones are loose and the head flaccid during an interval, it will be fair to suppose the case one of hydrocephalus, especially if we find the pulsations of the fœtal heart have ceased.

I need not say that the diagnosis will be much more difficult if the feet present, although the same principles of treatment apply equally, first having established the impracticability of delivery, from relative disproportion.

In *ascites,* there is much less obscurity; the head having been expelled, it is easy to see that the difficulty arises from the distension of the abdomen of the child, and a careful examination will, in most cases, distinguish between ascites and tympanites. In the latter case, the air is seldom limited to the abdomen, but the face and chest will be found more or less puffed.*

M. Depaul has published a memoir upon *distension of the fœtal bladder*, as an impediment which he seems to think more common than simple ascites. He recommends puncture of the bladder through the abdominal parietes as the only remedy, and after birth an attempt to remedy the original defect which occasioned the retention.† A similar case is recorded by M. Hecker,‡ and Dr. Braxton Hicks.§ A case of difficult labour from enormous enlargement of the kidneys is on record,|| and a second by Dr. Key;¶ but, as far as I know, these are the only ones. Dr. Gervis gives a case of distended abdomen impeding labour.**

Double monsters are very rare, and may create great difficulty in the delivery, although there are cases on record of the children having been born alive. Dr. Burns quotes several such: "In the seventh volume of the Nouv. Journ., p. 164," he says, "is a case where two children were born at the full time, united by the inferior part of the belly, from the centre of which came the cord.

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* Ed. Med. and Surg. Journal, vol. xvii. p. 561; Obstet. Trans., vol. iv. p. 285.

† Ranking's Abstract, vol. ii. p. 266, from L'Union Médicale.

‡ Monat. f. Geburt., Nov. 1861.

§ Obstet. Trans., vol. v. p. 287.

|| British and Foreign Med.-Chir. Review, Oct. 1855, p. 557.

¶ Ed. Med. Journal, July, 1862.

** Obstet. Trans., vol. v. p. 284.

The vertebral columns almost touched at the lower part. The two children, who were of different sexes, lived, we are told, twelve days, but nothing is said of the labour. In the Bulletin for 1818, p. 2, two children, who were joined by the back of the sacrum, are stated to have been born, and lived till the ninth day. The first child presented the head, but the midwife could not well tell how the second got out. There is another case, at page 32, of a woman who, after many days of labour, bore a monster double in its upper parts. The spinal column was united from the sacrum to the top of the dorsal vertebræ, then the cervical vertebræ divided to form two necks. The midwife finding the head to present along with the cord and a hand, tried to turn, but could discover nothing but superior extremities. She therefore let her alone. The head was afterwards expelled, but neither nature nor art could deliver the body. M. Ratel finding the head and two arms already almost separated from the body, cut these parts off, then introducing his hand, he found another head, turned the child, and brought away the whole mass."

There is a skeleton in the Royal College of Surgeons of Ireland of a double monster, the children being joined by the lower part of the sacrum, and I believe they were also born alive. The Siamese twins are another instance of the kind; and two similarly joined were in the possession of the late Dr. Montgomery.

TREATMENT.—I have already stated the general principle by which we are to be governed in all these cases. Whenever the monstrosity adds so much to the bulk of the child as to render the delivery impracticable by the natural powers alone, or assisted by the forceps, we must lessen the bulk.

In cases of hydrocephalus there need be no hesitation if the head be not too large to pass; no interference is required whether the child be alive or dead; but if it be so large that it cannot pass, we have no choice but to perforate. In the majority of cases the child is dead before the operation. The ground of the operation is the mechanical impediment to delivery, and the death of the child will justify an early interference. The operation is very easy; but, should the operator not have suspected hydrocephalus, but disproportion from another cause, the sudden rush of water may alarm him lest he should have perforated the bladder. In footling cases the head must be perforated behind the ears.

When the body cannot be extracted, owing to the distension by air or water, relief may be afforded by plunging the perforator into the body.

As to the double monstrosity, Dr. Burns remarks very truly, "the general principle of conduct must be, that, when the impediment is very great, and does not yield to such force as can be safely exerted by pulling that part which is protruded, a separation must be made, generally of that part which is protruded, and the child afterwards turned, if necessary. Unless the pelvis be greatly deformed, it will be practicable to deliver even a double child by means of perforation of the cavities, or such separation as may be expedient, and the use of the hands, forceps, or crotchet, according to circumstances. A great degree of deformity may render the Cæsarian operation necessary."

I may add, as a caution to my junior readers, that the destruction of a monster *after* birth (no matter how great the deformity) is punishable as infanticide.

CHAPTER XVIII.

PARTURITION.—CLASS III. COMPLEX LABOUR.

ORDER 1. PROLAPSE OF THE FUNIS UMBILICALIS.

Having fully considered natural labour where the agents or elements of parturition are equally balanced; and unnatural labour, where the abnormal deviation is dependent upon some deficiency or irregularity in the power, the passages, or the child, we shall now pass on to the third class, or complex labour of which, as I observed before, the characteristic peculiarity is not anything in the mechanism of labour, but consists in some accidental complication. The labour itself may be natural or unnatural, but more frequently the former than the latter: however, with the consideration of the labour (except as connected with the complication) we have nothing to do.

The first complication I shall describe is *prolapse of the funis*, either alone or along with the presenting part; and occurring either at the commencement or during the course of the labour. This accident has no influence whatever upon the progress of the labour; but a very serious one upon the life of the child, and any interference which may be advised is for the purpose of rescuing it from peril.

Statistics.—We may form some idea of the frequency of its occurrence, and of the result to the child, from the following table:—

1. *Frequency.*

British Practice.

Authors.	Total No. of Cases.	Prolapse of Funis.
Dr. Bland . .	1,897	1
Dr. Jos. Clarke .	10,387	66
Dr. Merriman .	2,947	8
Dr. Granville .	640	1
Ed. Lying-in Hos.	2,452	3
Dr. Collins . .	16,414	97
Dr. Cusack . .	398	5
Dr. Maunsell .	839	2
Mr. Gregory .	691	7
Dr. Beatty . .	1,182	6
Dr. Lever . .	4,666	6
Dr. Reid . . .	3,250	16
Mr. French . .	89	1
Dr. Churchill .	1,525	7
Drs. M'Clintock & Hardy	6,634	37
Dr. Bliss . . .	771	1
Dr. Metcalfe . .	300	2
Mr. Rose . . .	600	2
Mr. Bailey . .	2,819	9
Dr. J. Lee . .	850	2
Dr. Copeland .	1,290	5
Mr. J. Thompson	3,300	3
Drs. Johnston and Sinclair	13,748	98
Dr. Hall Davis .	13,916	40
Dr. R. U. West .	2,106	9
Mr. Harrisson .	1,000	6
Dr. Cross . .	4,733	13
Mr. Smart . .	5,026	22
Dr. Lawrence .	1,000	5
Mr. Dunn . .	3,821	11
Mr. Bailey . .	6,476	21
Dr. Steele . .	5,310	9

French Practice.

Authors.	Total No. of Cases.	Prolapse of Funis.
Mad. Boivin . .	20,357	39
Mad. Lachapelle	15,652	41
M. Mazzoni . .	452	18

German Practice.

Authors.	Total No. of Cases.	Prolapse of Funis.
M. Richter . .	624	4
A. E. v. Siebold .	492	2
Dr. Voigtel . .	29	1
Dr. Jansen . .	13,369	86
M. Bartsch . .	4,425	16
M. Klein . . .	5,490	55
Dr. Arneth . .	6,608	33

Thus, in British practice it occurred 521 times in 121,147 cases, or about 1 in $232\frac{1}{2}$; in French practice, 98 times in 36,546 cases, or about 1 in 373; and in German practice, 197 times in 31,037 cases, or about 1 in $162\frac{2}{3}$. Taking the whole together, we have 188,730 cases, and 816 examples of prolapsed funis, or about 1 in $231\frac{1}{2}$. In the Dublin Lying-in Hospital, in 51,061 cases, it occurred 304 times, or 1 in 168.

The risk to the child may be estimated from the following table:—

2. *Mortality.*

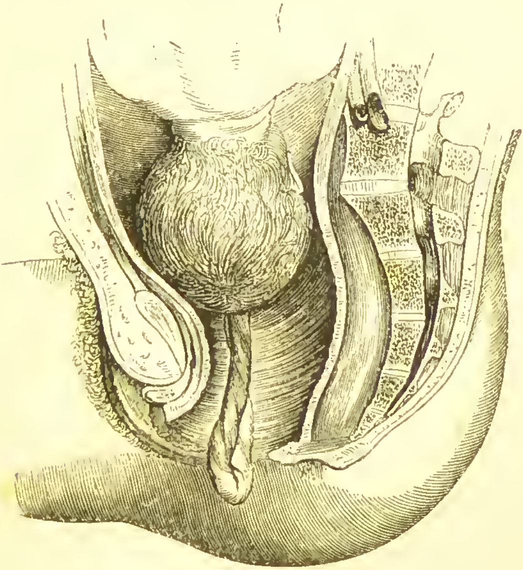
Authors.	Cases of Prolapse.	Children lost.	Cord replaced.	Delivered		
				Nat.	by Version.	by Forceps.
Mr. Giffard . . .	21	17	2	...	15	5
Dr. Smellie . . .	6	2	...	...	5	
Mr. Perfect . . .	4	3	...	...	4	
Dr. Jos. Clarke . .	66	49				
Dr. Merriman . .	8	4				
Dr. Ramsbotham .	1	1	...	...	1	
Dr. Collins . . .	97	73				
Dr. Cusack . . .	5	5				
Mr. Gregory . . .	7	4				
Dr. Beatty . . .	6	4				
Mr. Lever . . .	6	2				
Dr. Churchill . .	7	5				
Mr. J. Thompson .	3	2				
Drs. M'Clintock and Hardy . . .	37	25	5	6		
Drs. Johnston and Sinclair . . .	98	42	...	61	16	9
Dr. Hall Davis . .	4	15				
Dr. Metcalf . . .	2	2				
Mr. Roberton . .	22	15				
Mr. Harrisson . .	6	5				
Mr. Smart . . .	22	13				
Dr. Lawrence . .	5	3	2	...	2	
Mr. Dunn . . .	11	8				
Mad. Boivin . . .	39	9	...	...	26	13
Mad. Lachapelle. .	41	7	14	1	12	13
Dr. Voigtel . . .	1	...	...	...	1	
Dr. Jansen . . .	86	38	...	...	46	6
Dr. Bartsch . . .	16	4	5	...	...	3
Dr. Klein	55	20	27	...	2	2
Dr. Arneth . . .	33	11	11	...	...	9

Here we find that out of 787 cases of prolapse, 410 children were lost, or more than one-half; a larger mortality than we find in any other order of practicable labour.

It must always be remembered, when speaking of the results of this accident to the child, that in lying-in hospitals many of the cases do not seek admission till some time after the occurrence, when the chance of a safe delivery is diminished; and some not until the cord has ceased to pulsate. Twenty-two such cases occurred out of the seventy-three unfavourable ones Dr. Collins has recorded; in eleven of Drs. M'Clintock and Hardy's, and twenty-one in Dr. Johnston and Sinclair's report.

CAUSES.—Many circumstances have been assigned as likely to *cause* or to *favour* the occurrence of this complication.

Fig. 122.



1. *Mal-position of the child.*—Smellie, in his plate of this accident, has represented the child lying across the uterus, with the umbilicus at the upper outlet, and the cord hanging down in the cavity of the pelvis; and Froriep regards this as an exact explanation. After a careful examination of the cases I have seen, and a tolerably extensive investigation into those recorded by authors, I can find few, if any facts in support of this view, and must therefore attribute the explanation rather to Smellie's ingenuity than to his observation.

2. It would appear that a *small* child, with a *large quantity* of the *liquor amnii*, by allowing the head of the fœtus to move away from the brim of the pelvis during the latter months, will favour the escape of a loop of the funis.

3. The *sudden rupture* of the membranes, and the *forcible rush* of a large quantity of the *liquor amnii*, may have a similar effect, and especially when aided by an untoward position in the mother, as occurred to a patient of mine who was standing up when the membranes suddenly ruptured.

4. It will be favoured by a *presentation of the feet or knees*, as they do not fill up the brim; and even where the cord does not descend at the commencement of labour, it may before the breech enters the pelvis. In short, if the presenting part do not block up the os uteri, the cord, being specifically heavier than the liquor amnii, will be apt to prolapse, as Mr. Roberton has observed.* M. Naegelè is not correct, however, in stating that it occurs most frequently in footling cases.

5. M. Naegelè adds *irregular shape*, or *irregular action of the uterus*, as an occasional cause.

6. *Excessive length* of cord forms undoubtedly an important element; but it requires other conditions also, since in the cases of cords of from thirty-six to fifty-four inches long, which I have noticed, no prolapse occurred.

7. I may state, from my own observation, that I have found, in several cases of prolapse, that the *placenta* was situated *low down* near the cervix uteri, and, in some few others, that the *funis was inserted into the lower edge* of the placenta.

There are cases, however, which are not attributable to any of these causes.

I have already mentioned a case in which prolapse was prevented by the coiling of the cord round the neck of the child.

In all cases of prolapsed funis, the child is in the utmost danger from the moment the upper strait of the pelvis is filled by the part of the child descending, in consequence of the pressure upon the cord, just as in footling cases. The effects of this pressure are in proportion to the time it is continued, if the cord be not partially shielded from it by its situation.

There are but few cases in which the child escapes safely when the labour is left to the natural powers. In those in which I have seen this happy result, the pelvis was very large, the child of a moderate size, and the pains very violent, so that the second stage of labour occupied but a very short space of time. The same result will obtain in those cases where the cord is shielded from pressure by being lodged in the angle at the junction of the sacrum and ilium. The chances will be still greater, if the patient have previously borne five or six children.

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* Phys. and Dis. of Women, and Midwifery, p. 339.

Treatment.—The means to be adopted will depend entirely upon the state of the prolapsed cord. Should it exhibit marks of putrefaction, or be without pulsation, it will be useless to interfere, because hopeless as regards the life of the infant, and the labour may be allowed to terminate naturally, or be terminated by craniotomy if there be any undue delay. Capuron advises us not to interfere at once, even though the cord should pulsate, but rather to wait until the pulsations become feeble. It will certainly be desirable that the os uteri should be as much dilated as possible; and if we discover the prolapsed cord before the rupture of the membranes, it will be well to postpone their rupture until that object be effected.

Various modes of management have been proposed.

1. We are advised to push the cord upwards, beyond the brim of the pelvis, and there to retain it with one or two fingers, until the upper outlet be filled by the descending head. This would seem easy and certain, but in practice it is not so; for the pains which force down the head, force down the cord also; and besides, there is some risk of displacing the head. This re-position is still more difficult, if any other part than the head present. On the whole, I believe I may say that it rarely succeeds. However, the experience of Dr. Halahan is in favour of re-position, of which he has published successful cases.* Dr. Arneth states, that in the Vienna Hospital, the funis was generally carried over and beyond the head of the child, and lodged in the hollow of the neck; and that of forty cases in his own practice and that of Klein and Bartsch in which this plan was adopted, thirty-eight of the children were born alive.†

2. It has been proposed to return the cord, and to hook it over the limbs of the child. This may also succeed, but it is a very difficult and a somewhat dangerous operation; and I am inclined to agree with Dr. Burns, that "if the hand is to be introduced so far, it is better at once to turn the child."‡ It is but right to add, that Sir R. Croft succeeded twice in this way.§

3. Various mechanical expedients have been contrived for retaining the cord when replaced. Thus, enclosing the cord in a leathern bag, and pushing it beyond the head of the child, was

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* Dublin Quarterly Journal, Aug. 1862, p. 206.

† Die Geburtshülfliche Praxis, &c., p. 138.

‡ Principles of Midwifery, p. 433.

§ Merriman's Synopsis, p. 99.

recommended by Mackenzie;* attaching the cord to the extremity of a canula, by Ducamp; or of a catheter, by Dudan;† the reductor, by Aitken; a thin elastic flat rod of steel, by Dr. D. Davis;‡ and a modification of some of these contrivances was suggested by Champion, Favereau, and Guillon.§ Dr. Harris, of Philadelphia, returned the cord above the knees in a breech presentation, and the child was saved.

4. Osiander, Busch, Hogben, and Hopkins, propose to retain the cord by introducing a piece of sponge after its replacement.

5. Dr. S. Merriman has twice succeeded in saving the infant, not by returning the cord, but by placing it in the angle formed by the junction of the sacrum and ilium, where it is in a great measure shielded from pressure.

If we determine to try the preceding plans, or if the advance of the head preclude any attempt at re-position, or lastly, if the cord come down during labour, we may increase the chances of safety by applying the forceps and hastening delivery, as soon as the head is within reach.

6. Dr. Gaillard Thomas, of New York, has proposed a modification in the re-position of the funis, so simple and so in accordance with common sense, that one only wonders that none of us ever thought of it before.|| He recommends that the woman should be placed on her hands and knees, so as to reverse the inclined plane formed by the cavity of the uterus and pelvis; and to have in our favour the influence of gravitation. In this position, if the membranes be not broken, it is possible that the loop of the cord may slip above the head spontaneously. If the cord have descended, the hand is to be introduced into the vagina, and the cord passed above the head, and the same position to be maintained for a few pains. In two cases in which he tried it, no part returned prolapsed, and the head coming forward, he had no further trouble with the cord. These views have been confirmed by Dr. Braudeis.¶

7. If the patient have had children before, and if the pelvis be roomy, and the soft parts well dilated, perhaps the best chance for the child is in turning, particularly if there should be a malpresentation. But as this operation is not without hazard to the mother, we should accurately estimate the favourable or unfavourable probabilities as regards the child, before we attempt it. Dr. M'Clintock has shown that while more children are saved by

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* Merriman, p. 99.

† Revue Méd., 1828, vol. iii. p. 502.

‡ Elements of Operative Midwifery, 1825, p. 170.

§ Velpeau, Traité des Accouchemens, p. 342. Ed. Brux.

|| Transactions of the New York Academy of Medicine, vol. ii. part 2, p. 21.

¶ Med. Times and Gaz., Sept. 1, 1860.

this than by any other method, the risk to the mother is not so great as has been supposed.

Madame Boivin turned the child in 25 cases, and used the forceps in 13 out of the 38 cases she has recorded, and saved 29 children. Madame Lachapelle, in 23 cases, used the forceps 13 times, and version 10; 17 children were saved. In one case, Dr. Collins saved the child by returning the cord, and retaining it by the hand in the vagina; in another, by enclosing it in a linen bag, returning it, and retaining it there by introducing a piece of sponge.

Should the delivery have been completed within a short time after the cord has ceased to pulsate, it will be our duty to employ for some time the usual means for resuscitating the child; so long as the heart beats ever so faintly, there is hope.

CHAPTER XIX.

PARTURITION.—CLASS III. COMPLEX LABOUR. ORDER 2. RETENTION OF THE PLACENTA.

In the definition of natural labour I included the expulsion of the placenta "in due time;" and when speaking of the third stage I mentioned that Dr. Clarke found the average interval between the birth of the child and expulsion of the after-birth was twenty minutes; and that out of 654 cases observed by myself, in 622 it was expelled within a quarter of an hour; from these data I remarked, "we may conclude, with the highest authorities, that in natural labour the placenta ought to be expelled within an hour or an hour and a half, and that when the interval exceeds this, the case fairly comes under the order of 'retained placenta.'"

There is, however, an exception to the stringent application of this rule, and that is when, from the length of the labour or its abnormal character, the uterus has been over-fatigued, so that it does not so soon resume its contractions. There is no reason to suppose the uterus exempted from fatigue in proportion to its exertions, any more than any muscle of the body; and when it has been so fatigued, we do find that it requires and takes a longer interval of rest than usual, and that after this has elapsed, it contracts again, and expels the remaining contents. In estimating the interval which ought to elapse before we interfere, we must, therefore, take into consideration the peculiar kind of labour and probable amount of fatigue, and allow a certain variation accordingly.

Some writers have recommended that the placenta should never be extracted except in case of hæmorrhage; but it was found, that if left to nature, it was occasionally retained until it putrified and excited uterine inflammation; for this reason, others recommended its immediate extraction; but the truth appears to lie between the two extremes. We do not interfere when the uterus is adequate to the expulsion, but when we are convinced that its efforts are suspended or inadequate, we extract it, to avoid the risk of hæmorrhage or inflammation of the uterus.

Definition.—I would, therefore, define cases of retained placenta to be those in which the uterus does not, after a due interval of rest, detach or expel the placenta, and which, consequently, require it to be extracted. This interval may be fixed at an hour or thereabouts, for ordinary cases; but, on the one hand, more time may be required if the fatigue have been excessive, and, on the other, prompt interference will be necessary if hæmorrhage supervene.

Statistics.—The following table will enable us to estimate its frequency, causes, and, in some measure, its consequences:—

Authors.	Total No. of Cases.	Retained Placenta.	Inertia.	Irregular Contractions.	Morbid Adhesion.	Mothers lost.
Mr. Giffard	...	24	3	7	11	3
Mr. Perfect	...	19	2	14	3	4
Dr. Jos. Clarke . . .	10,387	21	...	5	...	5
Dr. Ramsbotham . . .	...	27	2	1	24	10
Dr. Granville	640	7				
Edin. Hospital . . .	2,452	6	...	...	...	6
Dr. Cusack	701	22	...	5	...	1
Dr. Maunsell	416	2				
Dr. Collins	16,414	66	37	19	10	6
Dr. Reid	3,250	32				
Dr. Beatty	783	1	1	...	...	1
Dr. Lever	4,666	37	22	...	15	
Dr. F. H. Ramsbotham .	68,435	403	1			
Dr. Toogood	1,135	24				
Dr. Lee	850	5	...	...	5	
Drs. Johnston & Sinclair	13,748	57	21	9	27	4
Dr. Lawrence	1,000	188				

From this it appears that, in 344,670 cases, it occurred 884 times, or about 1 in 388. In 243 cases, where the result to the mother is given, 40 died, or about 1 in 6: but much allowance must be made for this excessive mortality, owing to the mismanagement on the part of midwives before an accoucheur is called in. The immediate cause of death is generally hæmorrhage.

Causes and Treatment.—The principal causes of retention of the placenta are:—1. Inertia of the uterus; 2. Irregular contraction of the uterus; and 3. Morbid adhesion between the uterus and placenta. These we shall consider separately, with their treatment.

1. *Inertia of the uterus.*—I have already stated that the contractions which expel the child generally detach the placenta, and often partially expel it, but it may be unaffected by them: in this state it will, of course, remain until the occurrence of uterine action. But cases not unfrequently occur in which the uterus remains quiescent after expelling the child, owing sometimes to the length and severity of the labour, and sometimes, apparently, to a peculiarity of uterine constitution; in other words, to a cause unknown. Now, if in such cases the placenta be entirely adherent, no evil consequences will result for some time; there is, of course, the risk of a partial separation occurring, and a secondary risk from decomposition if it remain long enough: but there is no immediate danger. On the other hand, if it be partially or wholly detached, and lying in the uterus, the separation will have exposed many large vessels, and the absence of uterine contraction permits the uncontrolled escape of blood, so that, in these cases, there is generally more or less flooding—it may be, even to a fatal extent: therefore, in addition to the more distant danger, which these cases share in common with the former, there is immediate danger from hæmorrhage of the most urgent kind. If the hand be placed upon the abdomen, the uterus is felt large and flabby, without any of the firmness which is its characteristic in a state of active contraction.

Treatment.—The promptitude of our interference depends entirely upon the presence or absence of flooding. If there be great hæmorrhage, the placenta must be instantly removed, either by traction by the cord, or by the introduction of the hand. There is one exception to this rule, however, and that is when hæmorrhage has occurred to such an extent that the patient has fainted, and is almost moribund: in this case a very little additional loss may be fatal, even so little as may occur on removing the placenta; and as for the present it is arrested by the syncope, we may postpone the operation until the patient rallies a little, taking care not to wait until the hæmorrhage return. "If there have already been hæmorrhage so profuse as to occasion danger," says Denman, "and the common consequences of loss of blood, as fainting and the like, have already followed, the placenta ought not then to be extracted, nor the patient disturbed, nor any change made, till she is somewhat recovered from her extreme debility; as the danger would be thereby increased, and the patient die, during, or immediately after, the operation, as I have seen and known in several instances."

There may, however, be no flooding: and in some cases it might be possible to remove the placenta by a steady pull at the cord, but, to say nothing of the risk of breaking it, we should only be exposing the patient to a risk of hæmorrhage by withdrawing the placenta whilst the uterus was relaxed. The best plan is first to try and excite the uterus to contract by friction and firm pressure upon the abdomen, and then to draw by the cord steadily and firmly. If the uterus still remain inert, we are recommended by M. Mojon, and some continental practitioners, to inject the umbilical vein with cold water, so as to stimulate the uterus by the impression of cold. I have mentioned this, but I should fear that there would be risk of exciting inflammation by it. I have, however, repeatedly given the ergot of rye in such cases, and with the best effects; when successful, it brings on uterine contractions, and causes the spontaneous expulsion of the after-birth, at the same time that it effectually guards against hæmorrhage. If it fail, we have no resource but to extract the placenta by the hand, an operation *never to be lightly undertaken*, as it is one of the most dangerous, in consequence of the frequency with which it is followed by inflammation. It should be performed very gently and deliberately. The fingers, formed into a cone, are to be introduced into the vagina and os uteri, in the axis of the outlet and brim, guided by the funis, and so gradually up to the placenta, which may be grasped by its inner surface, as Hamilton and Burns recommend, or the finger may be gently insinuated between it and the uterus, so as to peel it off very carefully and gently. Great care must be taken, on the one hand, not to injure the surface of the uterus, and, on the other, to remove the whole of the placenta; and having done this, the detached mass should be grasped, and the uterus, which by the operation will be excited to action, allowed to expel both it and the hand. By so doing we shall secure its contraction, and guard against hæmorrhage, and meanwhile external pressure should be exerted by the other hand, and maintained by compresses and the binder. This operation should never be performed without clear conviction of its necessity. I perfectly agree with Dr. Denman, who observes, that although "it is often mentioned as a slight thing, yet I am persuaded that every person who attends to the consequences of the practice will think it of importance, and that, if possible, it always ought to be avoided."

After the operation, we must remain some time with the patient, to be sure that the uterus does not again relax, and hæmorrhage ensue, giving ergot of rye if there be the least threatening, and for some time watch carefully lest inflammation should set in.

2. *Irregular contraction.*—After the delivery of the child in ordinary cases, the uterus closes equably over the after-birth, pressing it on all sides and forming a globular tumour in the abdomen. There are occasional, though rare, exceptions, however, to this equal contraction, in which the uterus contracts unequally, and yet forcibly, and so far from effecting the expulsion of the placenta, which is the principal object of its contraction, it is thereby effectually retained. This irregular contraction sometimes follows natural labour, but more frequently labour with mal-presentation or instrumental delivery, and it is attributed (not without justice, I think, in some cases) to the action of the ergot of rye.*

There are three kinds of irregular contraction which may be briefly noticed: 1. The first is seldom noticed in books, and yet it is of frequent occurrence. It appears to consist in a contraction of the fibres of the cervix uteri to a greater degree than of those of the body and fundus. If the hand be placed upon the abdomen, the uterus is to a certain degree, but not firmly, contracted, whilst, if the finger be passed into the os uteri, the cervix is found to be hard and contracted, and the cord when pulled does not *give*. The placenta is sometimes adherent, but more frequently partially or wholly detached, and a portion of it may often be felt in the os uteri. In common with the other varieties of irregular contraction there is sometimes hæmorrhage, but frequently none at all, and the necessity for interference chiefly arises from the indisposition of the uterus to rectify the irregularity and expel the after-birth. The globular tumour, moderately contracted, the narrowed os uteri, and the firm retention of the placenta, even when partially or wholly detached, will distinguish these cases from all others.

2. The second irregular contraction is that which has received

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* Hasbrouck, New York Journal of Med., Nov. 1853, p. 334.

the name of "*hour-glass contraction.*" The fibres around the body of the uterus are thrown into a state of permanent contraction, the remaining portion being only in a state of moderate action, giving to the uterus something of the figure of an hour-glass, and dividing its cavity into two unequal chambers, an upper and a lower, in the former of which the placenta is mainly or entirely contained. It may be entirely adherent, or partially or wholly detached, though seldom the latter. Occasionally there is hæmorrhage. This variety of irregular contraction has been attributed to the too rapid passage or extraction of the child; to a lingering labour with women of an irritable constitution, and to the partial action of ergot. Dr. Douglas thinks that hour-glass contraction rarely or never occurs without morbid adhesion of the placenta. Drs. Campbell and F. Ramsbotham deem it a very rare occurrence. It is very seldom that we can discover any irregularity of form in the uterus by placing the hand on the abdomen, and, in consequence, the diagnosis is very obscure, until the hand be introduced for the purpose of extraction.

3. The third irregularity is a preponderating contraction of the circular fibres of the uterus, throwing the organ into the shape of a long cylinder, so that it feels narrower than usual; and instead of a globular tumour just above the pubis, it is often felt reaching up above the umbilicus, and internally it may be difficult to reach to the fundus. As in hour-glass contraction, there is not always flooding, and the causes are probably the same. The diagnosis is aided, however, by the shape of the uterus, although it is often sufficiently obscure.

Treatment.—The first variety of irregular contraction can generally be remedied without the introduction of the hand. Steady and firm traction should be made by the cord in the axis of the brim, and maintained for some time without relaxation, at the same time that very firm pressure is made over the uterus, in the axis of the brim; this in many cases overcomes the spasmodic action, and the placenta is rather suddenly released. If it fail, one or two fingers introduced within the os uteri may be sufficient, as they may be able to seize a portion of the after-birth, and so aid in the traction. I have seldom found it necessary to do more than this; but of course if it do not succeed, the placenta must be extracted by introducing the hand carefully and gently, as before described.

In the *second* and *third* form of irregular contraction, traction by the cord is quite ineffectual, so firmly is the placenta grasped. We can only wait, therefore, until we are satisfied that it will not be separated and expelled naturally, and cannot be withdrawn by the cord, and then at once proceed to extract it. The introduction of the hand is to be effected in the way already described, until we arrive at the contraction, which is to be overcome by gentle but steady pressure of the points of the fingers gathered into a cone; and when we reach the placenta, we must remember to detach the whole, and to allow the hand to be expelled by the uterus. In the hour-glass contraction, the lower chamber is so complete, and the contraction so close, that persons have suspected that the aperture through which the cord was traced was, in fact, a laceration: a little patience and perseverance, however, will show the true state of the case, and besides, although the child often escapes through a laceration into the abdomen, it is very rare for the placenta to do so. Opium and venesection have both been recommended for the relief of irregular contraction; but I quite agree with Dr. Ramsbotham that both are objectionable.

Let me again impress upon my readers the necessity of great care to secure the regular, equal, and permanent contraction of the uterus afterwards.

3. *Morbid adhesion of the placenta to the uterus.*—Many of the diseases of the placenta, to which I have heretofore referred, may occasion adhesion between its outer surface and the inner surface of the uterus. Thus inflammation may end in the effusion of lymph connecting the two, or in induration. Again, the adhesion has apparently been effected by calcareous or scirrhous deposition. The space occupied by the adhesion is generally limited.

This accident is manifestly the result of disease during pregnancy, and has no relation to the kind of labour. It is much more dangerous than irregular contraction, because the uterine action generally detaches more or less of the placenta; but the adhesion retaining the mass in the uterus, prevents its contraction and the closure of the bleeding orifices of the uterine vessels. We find, therefore, more or less flooding, sometimes to an enormous extent. Almost the only exceptions are the few cases where the adhesion is very extensive, and the detached part small.

The diagnosis is in almost all cases impossible, until the extraction is attempted: a strong suspicion will be excited, however, by the occurrence of uterine contraction, without extrusion of the after-birth. The previous history of the patient may in some degree confirm these suspicions; if she have suffered much pain in some fixed part of the uterus during pregnancy, it may have resulted from inflammatory action. Whenever we see a patient suffering thus, we should always ascertain by the stethoscope whether it is in the situation of the after-birth, so that we may be prepared for the consequences at the time of labour.

Treatment.—As we cannot be sure that the retention arises from adhesion, we must only have recourse to the usual preliminary means, and, finding them ineffectual, to extraction. The hand is to be introduced in the usual manner, and on trying to separate the placenta, we shall discover that some part of it is closely adherent, as it were amalgamated with the uterus. It would be extremely wrong to use violence in endeavouring to detach it; if, therefore, we cannot easily effect this, it is better to peel off the placenta all round up to the adhesion, and then to separate the loose part from the adherent portion close round the adhesion, leaving the latter in the uterus to soften and come away with the lochia. In a case of Dr. Smellie's, in which he removed the indurated and adherent portion, the patient died of hæmorrhage; and several similar cases are on record.

It cannot be denied that danger may arise from the decomposition of what remains; but we have no means of avoiding it, except by care afterwards. If the discharge be very offensive, vaginal injections of tepid milk and water should be used twice a-day, and any symptoms of inflammation *promptly treated.*

The extraction of the placenta may be rendered necessary by the rupture of the cord, inasmuch as we can afford no assistance; but it is by no means so easy, as we lose the guide it affords us into the os uteri and to the situation of the placenta. In such a case, of course, we must first try fairly what the natural powers, stimulated by friction and ergot, will effect, and if they fail, the hand must be introduced with great caution, and the placenta very gently sought for, and detached in the usual manner. Once more let me repeat the necessity of removing all the placenta, for a small portion left behind may render all our exertions fruitless as to the result.

I have deferred the consideration of the treatment of the hæmorrhage until the next chapter, as I preferred limiting this chapter strictly to the management of retained placenta; the two chapters should, therefore, be taken together.

CHAPTER XX.

PARTURITION.—CLASS III. COMPLEX LABOUR. ORDER 3. FLOODING.

THERE is no deviation from the ordinary course of labour so trying to the medical attendant as flooding; not only on account of the imminent danger, but from the sudden and rapid progress of the attack, and the impossibility of waiting for assistance. Nothing can preserve our calmness and presence of mind under such circumstances, but understanding the subject clearly beforehand, and being perfectly prepared for meeting each variety of the accident with its appropriate treatment.

I have already spoken of the hæmorrhage accompanying abortion, and it remains now for us to consider those forms of flooding which occur just previous to or during labour, and afterwards. During the last month of gestation and at the commencement of labour, patients are exposed to two forms of hæmorrhage, differing in their causes, but depending upon the situation of the placenta. The first has been called "*accidental hæmorrhage*," because it arises from a partial and accidental separation of the placenta, which occupies its usual situation; and the second is justly termed "*unavoidable hæmorrhage*," because the placenta, being placed partially or wholly over the os uteri, the dilatation of this will unavoidably separate the after-birth, and give rise to hæmorrhage: as Naegelè has observed, "the very action which nature uses to bring the child into the world is that by which she destroys both it and its mother." After delivery, flooding may occur to any extent, and from various causes.

Each of these varieties of hæmorrhage will require a separate and careful consideration. But first let us ascertain their frequency and mortality, as far as possible.

STATISTICS :—

Authors.	Total No. of Cases.	Flooding Cases.	Mothers lost.	Children lost.	Accidental Hæmorrhage.	Mothers lost.	Unavoidable Hæmorrhage.	Mothers lost.	Hæmorrhage after Labour.	Mothers lost.
Mr. Giffard . . .	...	35	6	14	1	...	19	5	5	1
Dr. Smellie . . .	...	34	13	16	6	3	24	8	3	2
Mr. Perfect . . .	...	18	6	7	8	2	6	3	2	1
Dr. Bland . . .	1,897	9	3	8						
Dr. Jos. Clarke .	10,387	24	5	10	10	4	4	1	10	
Dr. Merriman . .	2,947	32	1	14	21	...	4	1	5	
Dr. Granville . .	640	2	...	...	1	...	2			
Dr. F. Ramsbotham	49,996	350	...	135	159	...	83	...	108	
Edinburgh Hosp. .	2,452	31	3	...	1	1	2	1	28	1
Dr. Collins . . .	16,414	131	12	17	13	2	11	2	107	8
Dr. Cusack . . .	701	15	...	...	6	...	...	...	5	
Dr. Maunsell . .	839	110	1	...	...	...	5	1	6	1
Dr. Beatty . . .	1,182	6	1	...	...	...	4	0	2	1
Dr. Lever . . .	4,666	51	4	7	16	...	13	2	35	2
Mr. French . . .	89	5	...	...	...	...	1			
Dr. R. Lee . . .	...	47	10	...	24	4	23	6		
Dr. Reid	3,250	52	...	...	22	...	3	...	27	
Mr. Warrington .	110	4	...	1	...	...	2	...	2	
Dr. Churchill . .	1,640	25	0	0	3	0	1	0	21	
Drs. M'Clintock and Hardy .	6,634	93	...	...	29	4	8	3	56	7
Birmingham Hosp.	650	...	...	...	...	...	4	1		
Mr. Earle . . .	4,320	...	...	...	...	...	22			
Mr. Rose . . .	600	20	...	...	18	...	2			
Mr. Bailey . . .	2,819	61	...	...	56	...	5			
Dr. Toogood . .	1,135	21	...	...	...	...	1			
Dr. J. Lee . . .	850	11	...	...	...	...	4	...	7	
Mr. Watson . . .	800	27	...	...	...	...	...	2		
Dr. Copeland . .	1,290	...	...	...	5	...	2			
Mr. J. Thompson .	3,300	13	3	5	...	...	5	2		
Drs. Johnston & Sinclair . .	13,740	105	10	43	81	4	24	6	33	2
Dr. Hall Davis . .	13,783	266	...	...	42	2	26	2	99	3
Dr. R. U. West .	2,106	48	...	...	...	...	7	3	27	
Dr. Cross . . .	4,733	...	...	...	...	...	19			
Mr. Smart . . .	5,026	...	...	...	...	...	9	3		
Dr. Lawrence . .	1,000	8	0							
Dr. Richter . . .	624	5	...	...	...	...	5			
A. E. v. Siebold .	730	9	2	1	...	...	3	2	6	0
Dr. Voigtel . . .	29	1	0	1	...	...	1	0		
Dr. Jansen . . .	13,365	11	...	...	4	...	17			
Dr. Bartsch . . .	4,383	...	...	...	...	...	11	6		
Dr. Klein . . .	11,410	...	...	...	...	...	5	2		
Dr. Arneth . . .	6,527	...	...	...	...	...	9	1		

From this table we find that in 170,221 cases, hæmorrhage occurred 1370 times, or about 1 in 124; out of 782 cases of hæmorrhage, 126 mothers were lost, or about 1 in 6; out of 944 cases, 288 children were lost, or about 1 in 3.

Further, out of 237 cases of accidental hæmorrhage, 34 proved fatal, or 1 in 7; out of 292 cases of unavoidable hæmorrhage, 79 proved fatal, or 1 in 3½; and out of 365 cases of flooding after delivery, 25 proved fatal, or about 1 in 14.

1. Accidental Hæmorrhage.—In these cases, as I have said, the placenta is in its ordinary situation; it may be at any part of the uterine parietes except the cervix, as then the case would come under the class of unavoidable hæmorrhage. The immediate cause of the flooding is the separation of some portion of the placenta from the womb and the laceration of its vessels; as these cannot be closed by the uterine contraction, because the uterus is full, of course the blood is poured out freely. The amount of the loss is said to be in proportion to the extent of the surface exposed, and, perhaps, in many cases this may be true, but there are striking exceptions: fatal hæmorrhage may take place from a space not more than an inch square. In some rare cases, a portion of the centre of the placenta is detached, and a cavity formed which is filled with blood, but as it is surrounded with adherent after-birth, of course none escapes externally. Or it may extend beyond the placenta, and be retained by the adhesion of the membranes or other causes. "In such cases," Dr. Burns remarks, "the effusion is accompanied with dull internal pain at the spot where it takes place. This pain is something like colic, or like the pain attending the approach of the menses. The part of the womb where the extravasation takes place, swells gradually, and in a short time the uterus feels larger. If the quantity be considerable, the size increases, the uterus is felt to be firmer and tenser, as well as larger, the strength diminishes, and some faintings may come on. In course of time, weak, slow pains are felt; but if the injury be great, these decline as the weakness increases. They may or may not be attended with the discharge of coagula from the os uteri." The hæmorrhage, in fact, is at first internal, and generally, though not always, becomes external. Dr. Burns suggests that in some cases the bleeding may be the result of a separation of the decidua, and a laceration of the vessels running to that membrane from the inner coat of the uterus, and not from a separation of the placenta.

Causes.—Violent shocks, such as blows, falls, &c., may have the effect of detaching a portion of the placenta, and in some cases a very slight shock will be sufficient; I was called to a case in which it was effected by a hearty fit of laughter. Besides these causes, fatigue, over-exertion, violent straining at stool, lifting heavy weights, excessive action of the utero-placental vessels, disease of the placenta, general plethora, spasmodic action of that portion of the womb to which the placenta is attached, may be equally effective. Dr. Burns observes, "We sometimes find that extravasation is produced by an increased action of the uterine vessels themselves, existing as a local disease. In this case, the patient for some time before the attack feels a weight and uneasy sensation about the hypogastric region, with slight darting pains about the belly or back." It may also occur in the course of labour, the placenta being partially detached by the uterine action, and may even prove fatal.

SYMPTOMS.—The exciting cause may be instantly followed by the discharge, or preceded by general and local uneasiness, dull pain and aching in the belly and back; and if the hæmorrhage be retained, by rigors, tension, and weight in the abdomen, and by faintness. Dr. Braxton Hicks* has collected 23 cases of concealed accidental hæmorrhage, in many of which there was no external hæmorrhage, and of which 15 proved fatal. Mr. James relates two cases successfully treated by ergot and brandy.† When the flooding is internal during labour, none may escape until after the expulsion of the child or placenta, as occurred with a patient of mine; and the characteristic symptoms are gradual diminution or cessation of the pains, with fainting, which may possibly be mistaken for symptoms of rupture, but differing from this latter accident in the *gradual* cessation of the pains, and the absence of recession of the head. At length, with or without a pain, the discharge commences, varying in amount from a few ounces to a quantity sufficient to compromise the patient's safety. If it be profuse, the patient faints, of course, and for a time the discharge is arrested; but after she has rallied, it again recurs, and the syncope is repeated. The surface is blanched and covered with cold sweat, the countenance sunk, with dark circles around the eyes, the pulse becomes weak, quick, and fluttering. If the flooding be not arrested, all these symptoms increase; the sight becomes dim, there is a ringing in the ears, frequent sighings, intolerable restlessness, uneasiness, jactitation, and death; preceded by fainting or convulsions. The fatal result is not always in proportion to the amount of hæmorrhage; in certain constitutions or in certain conditions, a comparatively small loss will end fatally, whereas in others a much larger loss will be borne with impunity.

Labour pains may come on at some period of the discharge, or they may be entirely absent; a good deal will depend on the period of pregnancy at which the complication occurs. If they do, it will be observed that during a pain the hæmorrhage is arrested, but that it returns on the cessation of the pain.

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* Trans. of London Obst. Society, vol. ii. p. 53.

† Lancet, Nov. 3, 1860.

If an internal examination be made, the os uteri will seldom be found dilated, unless there have been pains for some time, but the cervix is generally softened and relaxed by the hæmorrhage; and what is of great importance, in most cases we can pass the finger within the os uteri sufficiently to ascertain the presence of the membranes, and that no part of the placenta is within reach.

As regards the child, this complication is most dangerous; if the hæmorrhage be excessive it is almost always still-born.

Diagnosis.—The diagnosis of accidental from unavoidable hæmorrhage is of extreme importance, inasmuch as the treatment of the two is essentially different. There are four points in which the two varieties differ remarkably, and which will enable us to distinguish them. In the first place, we can generally make out some definite external cause for accidental hæmorrhage, and its occurrence is accidental and irregular, whereas in unavoidable hæmorrhage the only exciting cause is the expansion of the cervix, and the time of its first occurrence has a certain degree of regularity. Secondly, in accidental hæmorrhage the discharge takes place freely, during an interval, but is at once arrested by a pain during its continuance; but in unavoidable hæmorrhage, the discharge, which continues also during the intervals, is greatly increased during the pains. Thirdly, in cases of accidental hæmorrhage, the os uteri is free, closed by membranes only, and the cervix is of equal thickness all round; whereas in placenta prævia the os uteri is more or less covered by the after-birth, or if it only reach to the edge of the cervix, the latter is felt to be considerably thickened at that part.

Lastly, in many cases we may ascertain the situation of the placenta by the stethescope, and its presence in the body or fundus of the uterus will decide the case to be one of accidental hæmorrhage.

I have already stated that weakening or cessation of pains, fainting, sense of distension, are the characters of internal hæmorrhage, with the absence of any other cause calculated to produce these symptoms.

Treatment.—The indications of management must be drawn from the period of pregnancy, the state of the os uteri, and amount of discharge.

Let us suppose that the patient has not arrived at her full time, that she has no pains, that the os uteri has not begun to dilate, and that the discharge is not profuse. In such a case the patient is not in immediate danger; and as prompt delivery would be difficult, it may be well to temporize, and see how far we can arrest the discharge. For which purpose the patient should be placed in bed on a hard mattress, and very lightly covered with bed-clothes; the temperature of the room should be reduced very low, and nothing but cold drinks allowed. Enemata of cold water exert a very powerful control in such cases. The plug may be used (according to the restrictions formerly laid down), inasmuch as the uterus being full, there is no danger of internal hæmorrhage to any extent. The best plug is cotton wool or French wadding, which may be most easily introduced through a cylindrical speculum; but we may use common tow, or one or two silk handkerchiefs; and the object will not be attained unless the vagina be quite filled.

Internally we may give the acid mixture, with a large proportion of acid; for instance, half an ounce of dilute sulphuric acid to six ounces of infusion of roses, an ounce to be taken every hour. To tell the truth, I think it is more highly estimated than it deserves. Lead, in large doses (gr. x. Acet. Plumb. 2dis horis), has been recommended: Dr. Conquest speaks favourably of it. It may be combined with opium, or either may be given separately. I have no doubt of the beneficial effects of opium, either in large doses (gr. ij.) or gtt. lx. Tr. Opii, or repeated small ones. I have also seen the Tinct. Cannabis Indicæ exert very beneficial influence.

Large drinks of cold water alone, or with the addition of the nitrate of potash, seem beneficial. Of course the patient cannot be allowed to sit up, or to leave her bed, and it is an advantage to free the bowels by enemata of cold water, as involving less effort in the evacuation.

There are many cases in which, under this treatment, the discharge is diminished, and the patient carried to her full time in safety; but in others it will fail, either on account of the increase of the discharge or because the pains of labour are brought on. In these cases, as well as in those where the amount of discharge is great from the beginning, another line of treatment is practised which would be very doubtful in the former case. I have said that the discharge is observed to cease during a pain, and the reason is simple. During a pain, the placenta is pressed by the contents of the uterus on the one hand, and against the bleeding vessels on the other, and by its pressure as a tourniquet, the flow of blood is arrested. An observation of this fact led to the inference, that if the liquor amnii were evacuated, the pains would be quickened, the pressure increased and rendered more permanent, besides that the labour would be sooner terminated. As Dr. F. Ramsbotham has remarked, "the vessels of the uterus are diminished in size by the contractions of the uterine parietes: the open orifices are in a degree plugged by the parietes being brought into closer and stronger contact with that portion of the placental mass disunited from the uterine surface; and the pains are usually increased in frequency and power by the augmented stimulus impressed upon the os uteri." Moreover, in cases of large flooding, we need not anticipate the usual delay in the dilatation of the os uteri; for, as I have mentioned, the hæmorrhage softens the cervix uteri, and prepares it to yield easily to the pressure of the head. In these cases, therefore, when the flooding is profuse, the pains recurrent, and the danger imminent, the membranes should be ruptured by the finger or a female catheter. Soon afterwards, we find the pains increase, the flooding diminish, and the labour advance.

For the clear understanding of the principles of this practice, and the cases to which it is suited, we are mainly indebted to the late Dr. Rigby of Norwich, who published his valuable essay on Uterine Hæmorrhage in 1775, although the plan was first recommended by Julian Clement and Puzos. That it is very successful we have the testimony of many authors, as Denman, Baudelocque, Merriman, Ramsbotham, Blundell, &c. Dr. Rigby succeeded by it in 64 cases, without having occasion to turn the child. Dr. Merriman in 30 cases. Dr. F. Ramsbotham in 23 out of 25 cases.

Some writers, as Hamilton, Burns, Stewart, &c., have opposed the evacuation of the liquor amnii on the following grounds:—1, that by it gestation is suspended: 2, that it is not certain to bring on labour in time to avoid danger: and, 3, that it may not arrest the hæmorrhage, and if not, we must turn and deliver under more disadvantageous circumstances. The first objection is true, but of no value, unless the others be true also; for if the operation succeed, and save the woman's life, which is in danger, the shortening of gestation is of no consequence. The second objection, though contrary to the general opinion, is better founded; for although, where there are pretty good pains, they increase after rupture of the membranes, especially if ergot be given, yet if there be little or no uterine effect before the membranes are ruptured, pains may not come on and the hæmorrhage may prove fatal. I saw one example of this, and on post-mortem examination, the head of the child was found filling the brim, and the uterus filled with blood. The third objection I think hardly holds good, if the pains have been good before rupturing the membranes; for most likely the pains will increase; and if not, there will be but little more difficulty in turning.

I should say, then, that if there be decided pains and dilatation, or good pressure upon the os uteri, that we may safely give an ample dose of ergot, and before the loss has been excessive, rupture the membranes for the purpose at once of arresting the hæmorrhage and hastening the labour. But if there be no uterine effort, or very slight pains, it would be dangerous practice to rupture the membranes. If you remember that the uterus is so filled that internal hæmorrhage cannot take place to a great extent, you will see that by plugging the vagina thoroughly, all external hæmorrhage can be stopped. If so, is it not better to do that, and gain time until an effort be made to excite uterine action? Besides, we often find that when we succeed in thus arresting the hæmorrhage for a time, on the removal of the plug (which ought to be done every day), it does not return. After filling the vagina thoroughly, therefore, I would advise that half-a-drachm of powdered ergot should be given every three or four hours for a time, until uterine action is fully excited, and then, if the hæmorrhage return, we shall be justified in rupturing the membranes. If this fail, or in place of it, we might try to bring on labour by dilating the os uteri by caoutchouc bags, as proposed by Dr. Barnes; or we may try the effect of galvanism, by which Dr. Radford succeeded in cases in which there was no uterine action and a rigid and undilated os uteri. Drs. Horninger and Jacoby, Mr. Cleveland, Mr. Dorrington,* Mr. Wilson,† and Mr. Clarke,‡ have also found a favourable result from its employment. If this fail, or be counter-indicated, then we must adopt the plan recommended (without any definite notion of the nature of the case) by Ambrose Paré, Guillemeau, &c. &c., viz., introduce the hand and bring down the feet, thus terminating the labour. The operation will be facilitated by the relaxation produced by the flooding, and though more dangerous for the child, if the mother's safety demand, it must be done.

The child may be premature, however, the os uteri not sufficiently dilated, or there may be other reasons why this operation is objectionable, although immediate delivery is called for; and in such cases, as the os uteri is generally soft and dilatable to a certain extent and the child dead, I have found it the best plan to perforate the head and extract with the crotchet. The operation is not difficult, nor is there any risk, if the operator be careful to protect the point of the perforator, and afterwards to extract slowly, cautiously, and at intervals.

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* Prov. Med. and Surg. Journal, March 11, 1846, p. 105.

† Ibid., April 29, 1846.

‡ Dublin Hosp. Gazette, March 1, 1848.

In the case of internal hæmorrhage occurring during the progress of the labour, the treatment will depend upon the stage of the labour and the amount lost, judging by its effects. If the patient be in danger of sinking, and the os uteri dilatable, but the head within the uterus, there can be no doubt that we must deliver by turning; but if the loss be moderate, we may perhaps afford to wait until the head descends into the cavity of the pelvis; and in all cases where it is within reach of the forceps, they ought to be used for immediate delivery, if the case be mechanically suitable. But little hesitation need be felt on account of the child in deciding upon the mode of delivery, as it is lost in almost every case of excessive hæmorrhage.

By a judicious application of the suggestions I have made, we shall be able to temporize beneficially in cases where no pains exist, or perhaps to carry on the patient to her full time; or if there be pains, or we succeed in exciting them, then, by one or other of these methods, we may almost always succeed in terminating the labour without incurring an additional loss of blood, and if that have not been excessive previously, the mother may be saved. As we have seen, nearly one in three is lost. There is danger to the child in proportion to the hæmorrhage, and additional danger if we are obliged to turn.

There are cases, however, to which we are called after alarming flooding has continued for some time, and although we succeed in delivering the woman, she may die afterwards from loss of blood. In such extreme cases, and such only, transfusion, as recommended by Dr. Blundell, seems to be the only resource. It has succeeded in fourteen cases on record; but it has also failed many times. It is performed by means of a syringe and tube: a small tube is inserted into the median or other vein of the woman's arm, and blood from a healthy person is taken up by the syringe, previously warmed, and after expelling all the air from the instrument, its pipe is passed into the small tube, and the blood very slowly forced in. If the lips or eyelids of the patient quiver, or the respiration become more difficult, we must stop, or death may result. If her countenance and pulse improve, we may continue. In this manner blood to the amount of sixteen or eighteen ounces may be gradually injected, if necessary; although a much less quantity may save the patient. Great care must be taken that the instrument be clean, and of a proper temperature, and that the blood be healthy and fluid. Two additional successful cases have been published by Mr. Wheatcroft.* Professor Martin has had a successful case, and he has collected fifty-seven cases, of which forty-three recovered.† Dr. Braxton Hicks has recorded two cases of failure;‡ Mr. Thorne§ and Dr. Braun each a successful one.||

In all these cases, a liberal but judicious allowance of stimulants is necessary; but in regulating the amount, we must not forget that the subsequent reaction will be somewhat in proportion.

As to the placenta, it is very often expelled immediately after the child, and if it be not, it will be much better to extract it, and secure a firm contraction of the uterus, than to allow the hæmorrhage to continue.

After the delivery is completed, the stimulants must be continued, if necessary, or chicken broth may be substituted for them. Notwithstanding the danger of suspending uterine action, I have seen so much benefit from small doses of laudanum combined with ammonia, that I have no hesitation in recommending its exhibition.

The utmost watchfulness will be needed to suppress any return of the hæmorrhage, and to enable us to guard against any subsequent attack; for it should always be borne in mind that hæmorrhage is by no means a guarantee against inflammation afterwards.

2. UNAVOIDABLE HÆMORRHAGE. *Placenta prævia, placental presentation*, &c.—In this variety, the flooding is the necessary consequence of the dilatation of the os uteri, by which the connexion between the placenta and uterus is separated, and the more the labour advances, until the head passes through the os uteri, the greater the disruption, and the more excessive the hæmorrhage. From this very circumstance it follows that the danger is much greater than in the former cases, and also that what in them was the natural mode of relief, is here an aggravation of the evil, and cannot be employed as a remedy.

In these cases the placenta may be situated partially or entirely over the os uteri (fig. 123), or it may come down only to the edge of the cervix uteri; and there is some difference in the management accordingly.

That the placenta was occasionally found at the os uteri was

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* British Medical Journal, April 10, 1858, p. 290.

† Year-book for 1860, p. 350.

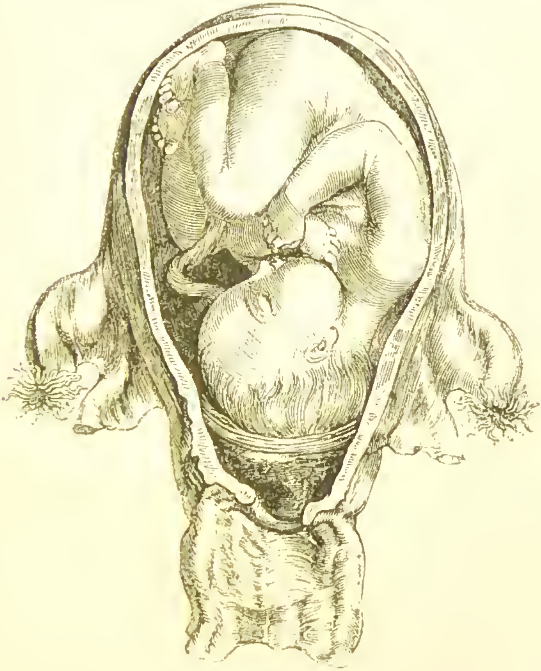
‡ Lancet, 1863, vol. i. p. 265.

§ Ibid., p. 266.

|| Wien. Wochensch., 1863, No. 21.

known as early as the time of Guillemeau, Mauriceau, Deventer, Pugh, &c., but they believed that it had originally been situated differently, but had been detached and fallen down. Paul Portal first spoke of it as adhering to this part, in consequence of which he was obliged to deliver by art. Giffard, Levret, Rœderer, and Smellie were also cognizant of this fact, and they seem to have been aware of the mode in which the hæmorrhage was produced, and of its inevitable occurrence. But it is undoubtedly to Dr. Rigby, of Norwich, that the profession is indebted for the full and clear elucidation of the subject. Time, which is the great test of merit, has only confirmed the truth of his observations, and illustrated the value of his essay.*

Fig. 123.



The cause of the hæmorrhage is evidently the separation of the placenta from the cervix uteri, and the exposure of the mouths of the torn vessels; and this separation is effected and increased by the uterine contractions dilating the os uteri. Sir James Simpson considers that the source of the hæmorrhage is, mainly at least, from the placenta, and that it is venous in character; in this I cannot agree with him. I am sure I have as frequently, at least, noticed the blood to be arterial as venous, and this observation has been confirmed by the late Dr. Mackenzie, of London, whose experiments appear to me to prove satisfactorily that, though some blood may escape from the separated portion of the placenta, by far the principal portion is from the uterine vessels.* Dr. Barnes also considers the uterus to be the source of the blood.

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* For full historical information, as well as exhaustive practical instruction, I may refer the reader to Dr. Read's valuable essay. Philadelphia, 1861.

Symptoms.—The first discharge is usually about three weeks before labour commences, coincident with the commencement of the process of dilatation already noticed. The amount of the discharge varies, but in general it is not excessive in the first instance, nor is it accompanied with pain. After its cessation, the patient rallies; but in a week or two it returns, perhaps in greater quantity, and again ceases, thus continuing (if not interfered with, or if premature labour do not come on) until the full term. Or the first discharge may be an excessive one so as to endanger life. With the first sensible contraction of the uterus, the flooding comes on more profusely, and is observed to increase during each pain. Thus it would go on until death supervened before delivery in most cases, if no assistance were afforded. I say in most instances, because there are some cases on record in which the placenta was forced through the os uteri before or along with the child, decidedly the happiest natural termination. The first case on record, I believe, is that by F. Lossius, in his Observ. Medicinal., 1672, p. 380, obs. 24, in the following words: "Tandem secundinam ante partum excluserat, non tantum fœtu sed et matre salvâ." I am indebted to my friend, Dr. Aquilla Smith, for his early example. Besides this, Smellie and Lee have recorded three; Ramsbotham five; Hamilton two; F. Ramsbotham two; Baudelocque, Perfect, Chapman, Merriman, Barlow, Collins, and Maunsell, one; &c. &c.†

Thus far the symptoms are alike (supposing the head to present), whether the placenta be situated entirely or partially over the os uteri or only down to its margin; but the difference is detected on making an internal examination. In the former case, the os uteri is felt to be closed by a thick, soft, spongy mass, firmer than a clot, and not breaking down under the finger, through which the presentation cannot be felt; in the second, this spongy mass stretches over a portion only of the os uteri; its edge can be distinctly felt, and also the membranes covering the remaining portion of the os uteri, through which we may be able to detect the presentation; whilst in the third case the os uteri is closed by the membranes only; but some portion of the cervix is found to be much thickened, whilst the rest is of the usual thickness; in the latter case, after delivery, the perforation in the membranes is found close to the os uteri. I should mention that in some cases where the placenta covers the os at the beginning, it is found to extend only partially over the orifice when dilated.

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* Association Journal, Dec. 23, 1853, p. 1127.

† Read on Placenta Prævia, p. 126.

If the feet present, with only a partial implantation of the placenta, or with it coming to the margin of the os uteri only, they may pass through the os uteri; and although the detachment of the placenta will increase with the dilatation, yet the flooding will be arrested by the pressure of the body of the child upon the placenta. This may be considered as the most favourable presentation in "placenta prævia," because it saves the introduction of the hand to turn the child. The effects of the hæmorrhage upon the mother are precisely as before described, but produced more rapidly, and more speedily fatal.

Diagnosis.—The sudden and apparently causeless occurrence of the first hæmorrhage, the increased discharge during a pain, and the detection of the placenta, partially or wholly covering the os uteri, or descending to its margin, are the distinctive characteristics of placenta prævia; in accidental hæmorrhage, as before observed, there is generally some assignable cause, the discharge is arrested during a pain, the os uteri is closed by the membranes, and the placental murmur can generally be heard away from the os uteri.

There may occasionally be some doubt as to whether the os uteri be closed by a clot or by the placenta; but the former is less firm, and is easily broken up by the finger, and we may often feel the adhesion of the placenta to the cervix within the os uteri.

Treatment.—If we are called on the occasion of the first or second hæmorrhages, and find that the discharge has not been great, and that the term of pregnancy not being complete, the uterus is not in action, we may try palliative treatment, as previously recommended, perfect quiet, rest on a hard bed, a cool room, and light clothing, with cold and acid drinks, enemata of cold water, small doses of opium, and the plug. The bowels must be gently freed. It is hardly necessary to say that in no form of uterine hæmorrhage is venesection admissible.

But the hæmorrhage may be so profuse as to demand interference, or if not so at first, it will become so immediately on the commencement of labour; and, from the nature of the case, there is no hope of a natural termination, unless the pains be so violent as to force away the placenta before the child; and as we need not wait for it, nor for the occurrence of uterine action, the only question is whether the os uteri is in such a condition as to admit the passage of the hand without risk of laceration. If not, which will probably be the case if gestation be not completed, we must wait, and fortunately, in the plug well applied, we possess a means of control over the discharge, for in this variety there is absolutely no danger of internal hæmorrhage. When we have thoroughly plugged the vagina, we may give any hæmostatic remedies we please, and on removing the plug, we must ascertain whether the os uteri is more yielding, and either replace the plug, or turn, according as we find, just as was advised by M. Leroux, in 1776. Very often, as in a case I saw lately, the flooding does not return, and if the placenta only partially cover the os uteri, labour may come on and terminate naturally.

Dr. Greenhalgh has proposed to bring on or hasten labour before the full time when the flooding is great, and by the use of the plug to allow the natural efforts to complete the delivery.* For the sake of both child and mother the sooner labour is over the better, and whether it be induced by dilating bags or by ergot, or separation of the membranes provided the plug be used, is, I think, of little consequence.

Dr. Hodges† recommends Wigand's plan of plugging the vagina, and trusting as far as possible to the natural process of labour.

But if, on examination, we find the os soft, yielding, or dilated, there is no occasion to delay, and the best plan is to terminate the labour before the woman's constitution has suffered greater damage.

The hand is to be passed in the usual way into the vagina, in the axis of the lower outlet, and its direction immediately changed into that of the brim, which will bring the points of the fingers near to the os uteri, into which they are to be gently yet firmly insinuated, and then passed between the placenta and cervix, on that side on which we believe the placenta to be narrowest, until it arrive at the membranes, which must be pierced, and the feet found and brought down. Some writers, Smellie and Mohrenheim, for instance, have proposed to perforate the placenta, instead of passing the hand between it and the uterus: this is by no means easy, and appears to me extremely objectionable. When the body of the child is in the pelvis, it will act as a tourniquet, and the flooding will cease; nevertheless, it is well not to delay the delivery, as internal hæmorrhage might occur. The mode of completing it I have already described: it is rarely that the child is saved.

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* Trans. of Obstetrical Society of London, vol. vi. p. 140.

† Obstetrics, p. 486.

In placental presentation, even more than in accidental hæmorrhage, it is desirable to extract the placenta if it do not follow the child immediately, and the same care and watchfulness will be necessary to secure a good permanent contraction, and to guard against subsequent hæmorrhage. Pressure above and over the uterus should be made with compresses and the binder, and if there be much draining, cold must be applied to the vulva, and ergot or cold enemata administered.

It is an advantage if the foot present, even when the placenta covers the os uteri, because the operation of turning is rendered easier; but when the os uteri is only partially covered, this is still greater, because by rupturing the membranes we facilitate the descent of the feet, and have only to seize them in the vagina and extract the child.

When the placenta reaches only to the margin of the os uteri, the case is truly one of unavoidable hæmorrhage; but yet it admits of the same treatment as accidental hæmorrhage, no matter what be the presentation, temporizing, if that be necessary, but if there be pains, after rupturing the membranes, the pressure of the head whilst dilating the os uteri will close the mouths of the bleeding vessels with the placenta, and so arrest the flooding until the child is expelled. This I have found by repeated experience, and therefore, when we are certain of the case, and pains are present, our duty is limited in the first instance to evacuating the liquor amnii; but if this fail, we must turn and deliver the child.

Such has been hitherto the mode of proceeding recommended by practitioners of the highest authority; it remained for my learned and ingenious friends, Dr. Radford and Sir James Simpson, to propose another, which at first sight is remarkable mainly for its boldness, but which Sir James Simpson has supported with his usual research, and which is at present the subject of controversy.

I have already stated that the placenta is sometimes expelled before the child, and that the mother is not always lost n these cases. Now, it appears that these instances are not so rare as was supposed. Sir J. Simpson has collected 56 published cases, and he has been furnished with 74 unpublished ones (130 in all), in which the placenta was either expelled or extracted first, and he finds that in all, 10 women died, or about 1 in 13: and of 110 cases the infant was born dead in 73, or 69 per cent., and alive in 33, or 31 per cent., *i.e.*, nearly every third child was saved. In placenta prævia, under ordinary management, 1 in 3, or thereabouts, of the mothers are lost, and more than half of the children.

Taking this as the basis of his proposal, Sir J. Simpson advises us in certain cases to substitute extraction of the placenta for turning the child. In justice to Sir James, it must be remembered that he does not intend that this plan should in every case supersede either the rupture of the membranes or turning the child.

Dr. Lee, of London, who has entered into controversy with Sir J. Simpson, has objected to the proposed plan:—1. That the mortality, under the ordinary treatment, as stated by Sir J. Simpson and me, is exaggerated; but he is far from having proved this. 2. That it was never practised by the older accoucheurs; but this would equally be an objection to any improvement. 3. That the child must inevitably be sacrificed: this would be a very serious objection, if the mortality among the children in the ordinary mode of treatment were small, but it is so great that it is an insufficient argument on which to reject the operation.

The probability of hæmorrhage after the extraction of the placenta would most likely occur to any one as an objection: but Sir J. Simpson states that "in 19 out of 20 cases in which it has happened, the attendant hæmorrhage has either been at once arrested, or it has become so much diminished, as not to be afterwards alarming." This Sir J. Simpson attempts to explain by the supposition that the bleeding proceeds almost entirely from the placenta, and not from the uterus. But Dr. Lee contends, and I think correctly, that it escapes from the uterine sinuses laid bare by the detachment of the placenta. Dr. Ashwell advocates this view, and, with others of high authority, decidedly opposes Sir James Simpson's plan of extraction.

Let us next see in what cases it is proposed to have recourse to this novel operation, and then we shall be in a condition to investigate its merits better. Sir James Simpson thus states the circumstances in which he would recommend it:—"When the hæmorrhage is so great as to show the necessity of interference, and is not restrainable or restrained by milder measures (such as the evacuation of the liquor amnii), but at the same time turning or any other mode of immediate or forcible delivery of the child is especially hazardous or impracticable, in consequence of the undilated or undeveloped state of the os uteri, the contraction of the pelvic passages, &c. Or, again, the death, prematurity, or non-viability of the infant may not require us to adopt modes of delivery, for its sake, that are accompanied (as turning is) with much peril to the mother, provided we have a simpler and safer means, such as the detachment of the placenta, for at once commanding and restraining the hæmorrhage and guarding the life of the parent against the dangers of its continuance. Hence, as I have elsewhere stated, I believe that the suppression of the flooding, by the total detachment of the placenta, will be found the proper line of practice in severe cases of unavoidable hæmorrhage, complicated with an os uteri so insufficiently dilated and undilatable as not to allow of version being performed with perfect safety to the mother;—therefore, in most primiparæ, in many cases in which placental presentations are (as very often happens) connected with premature labour and imperfect development of the cervix and os uteri; in labours supervening earlier than the seventh month; when the uterus is too contracted to allow of turning; when the pelvis or passages of the mother are organically contracted; when the child is dead; when it is premature and not viable, and where the mother is in such an extreme state of exhaustion as to be unable, without immediate peril of life, to be submitted to the shock and dangers of turning or forcible delivery of the infant. This enumeration is far from comprehending all the forms of placental presentations that are met with in practice; but it certainly includes a considerable proportion of the cases of this obstetric complication; and among them, all, or almost all, of the most dangerous and most difficult varieties of unavoidable hæmorrhage. In adopting the practice, one error, which I would strongly protest against, has been committed in some instances. Besides completely detaching and withdrawing the placenta, the child has been subsequently extracted by direct operative interference. If the hæmorrhage ceases, as it usually does, upon the placenta being completely separated, the expulsion of the child should be subsequently left to nature, unless it present preternaturally, or the labour afterwards show any kind of complication which of itself would require operative interference under any other circumstances. Both to detach a placenta and extract a child would be hazarding a double, instead of a single operation."

Dr. Radford states that the placenta ought never to be detached in such cases, unless, "1. The danger to the woman is so great from exhaustion as to render the ordinary plan of delivery, by turning the child, hazardous. 2. When there exists some obstacle to the extraction of the child, either from distortion of the bones of the pelvis, or tumours connected with it, or in its cavity, but connected with the soft parts. 3. When the child is dead." Subsequently, he protests against the operation until the cervix and os uteri will allow the introduction of the hand, as that "is the only instrument by which the placenta should be detached; indeed, I hesitate not to say, that it cannot be safely and effectually separated by any other means."

Dr. Edwards thus sums up the cases in which this practice seems admissible:—1. When the patient is of so weakly and delicate a constitution that loss of blood to any great extent would be attended with present danger and subsequent injurious effects. 2. When the child is well ascertained to be dead. 3. In cases in which the powers of life have been excessively lowered by the hæmorrhage, and the os uteri remains firm and unyielding. 4. In cases in which, although the os uteri is dilatable, the powers of life would be unequal to the shock of turning. 5. In primiparæ, when the soft parts are so contracted that they would be liable to be bruised or torn in turning. 6. In contracted pelvis.

We shall now examine in detail the practical value of this operation in the cases proposed, so far as our facts will permit, and assuming the correctness of Sir James Simpson's statistics. The rates of mortality, by the ordinary treatment, I believe to be about one in three of the mothers, and sixty-five per cent. of the children, according to a statement of Dr. Lee's, quoted by Sir James Simpson, *i.e.*, of course, taking large numbers. According to Sir James, when the placenta has been first expelled or detached, the mortality is one in fourteen of the mothers, and sixty-nine per cent. of the children. So far there appears to be an important advantage gained by the new method, but it will be found, on further inquiry, that there are great difficulties, if not insurmountable objections to it.

1. There appears to me great practical difference between the placenta being expelled first, and extracted first, although Sir J. Simpson makes none, but includes both equally in his statistical table. The former is the result of vigorous uterine action: the latter may or may not be accompanied by it; and I think there is much force in the doubt expressed by Dr. Barnes, as to whether the results would be as favourable in cases of detached as of expelled placenta. The 17 cases quoted from Dr. West by Sir James Simpson, are much too few for proof. Dr. Radford has given

two tables, the first of 41 cases, and the second of 14 cases, in which the placenta was separated and detached by the hand, and of these 5 mothers were lost, or 1 in 11, and 7 children saved, or 1 in 8. Of 20 no information is given. We must remember that in the one case there is no irritation, no force applied to the cervix and os uteri, in the other there must be.

2. This distinction between detached and expelled placenta alters the ratio of mortality among the children fearfully. Sir James Simpson has recorded in his tables but one case of the child being born alive, when the interval after the expulsion or extraction of the placenta was more than 10 minutes; and 16 of the 17 children, in the cases quoted from Dr. West, were lost. If any attempt be made to save the child by artificial delivery, this will be to "incur the hazard of a double operation," and will defeat the object of Sir James Simpson's proposal.

3. In Sir J. Simpson's first table, of 47 cases, with an interval after the expulsion or extraction of the placenta of from ten minutes to ten hours before the birth of the child, I find that delivery was completed by art in 18 cases, in 14 of them by turning. In the second table, of 21 cases, where the interval was less than ten minutes, in 7 cases by turning, and in one by evisceration. In the third table, of 27 cases, where the child came with the placenta, or followed immediately, there are 5 cases of turning, and 1 of extraction recorded. In the fourth table, of 27 cases, where the interval is unknown, delivery was effected by turning in 15 cases, by the forceps in 2, and by decapitation in one.

From this it appears that in a very large proportion of cases (46 cases in 119), artificial delivery was necessary, in many, no doubt, from mal-presentation; but still, in these cases, detachment of the placenta alone would have been useless, in many injurious; nor, if the operation were performed before the dilatation of the os uteri, could the mal-presentation have always been ascertained. Again, we find that delivery by art was more frequent, according as the interval after the separation of the placenta was prolonged, and I should suppose, although Sir James does not mention it in his tables, that the interval would be much greater in cases where the placenta is extracted than where it is expelled, and, consequently, that the probability of a second operation being necessary would be greater in such cases, which would constitute another important difference between these two classes of cases, or, as Sir James Simpson admits, would double the hazard.

Of 41 cases given by Dr. Radford, "in 18 turning was performed, in 6 it is presumed to have been so, in 1 the child was drawn by the presenting leg, 16 were terminated by the natural efforts, 1 by the vectis, 1 by the perforator and crotchet." In table 2nd, of 14 cases, 2 were terminated by the natural efforts, 10 by turning, 2 by the forceps.

4. The first class of cases in which Sir J. Simpson thinks this new method advisable, is where the hæmorrhage is excessive, and the os uteri undilated and undilatable. Now, although it is evident that so long as this state continues (fortunately it is rather the exception than the rule), turning is impracticable, I confess I do not see how the placenta can be easily or safely detached. I put out of the question using any instrument but the finger for this purpose, for I quite agree with Dr. Radford that any other would be extremely hazardous to the mother under such circumstances. And I concur with him, that "in those cases of unavoidable hæmorrhage which occur before the expansion of the cervix uteri, it would be quite impossible to force the finger along the cervical canal, and reach the edge of the placenta, so as entirely to detach it; and in those cases which occur at the latter part of pregnancy, or beginning of labour, with a rigid os uteri, it appears to me to be out of the power of the operator, with the finger alone, to reach so far as the edge of the placenta." It must also be borne in mind that Sir James Simpson's favourable rate of mortality does not apply to this class, as there are no statistics of such cases.

5. "In premature labours, with an undeveloped os uteri," there will be the same difficulty in detaching the placenta, whether the child be viable or not, and we are in the same ignorance of what would be the result to the mother.

6. In a great number of the cases in Sir James Simpson's tables (23 in 91), as we have seen, the presentation was abnormal, of the shoulder, arm, or hand and head, and in such cases artificial delivery must take place, and it may be a question whether, if we first merely removed the placenta, on account of the exhaustion of the mother, we should not thereby increase the difficulty of turning at a subsequent period.

7. In the cases mentioned by Sir James Simpson, Drs. Radford and Edwards, of distortion of the pelvis, or tumours in the soft parts offering an obstacle to the extraction of the child, the new operation would not be exactly an alternative, but a substitute, as version would be out of the question in most instances, and the doubt remains whether it could be effected if the obstacle were great. If it could, it might facilitate the use of the perforator and crotchet.

8. In cases of extreme exhaustion, where the mother is unable to bear the shock of turning or any additional loss of blood, if the

os uteri be dilated or dilatable, and the circumference of the placenta within reach—as the hæmorrhage is said to cease after the removal of the placenta—the operation may be admissible for the purpose of gaining time, even with the chance of artificial delivery afterwards.

9. In cases where the flooding is considerable, the presentation natural, and the pains strong (the cases in which the placenta is sometimes expelled before the child), there seems to be no objection to arrest the hæmorrhage by the removal of the placenta, leaving the conclusion of labour to the natural powers, either alone or stimulated by galvanism, as Dr. Radford has proposed. To those two classes the results of Sir James Simpson's statistics almost exclusively apply.

I have thus examined with care this most difficult subject, and although I would be far from pronouncing dogmatically upon it, I feel bound in duty to state, that except in the cases I have mentioned, I could not consent to substitute the new method of treatment for the old, and even in those cases I would recommend the very utmost caution.

Dr. Robert Barnes has proposed another mode of treatment based upon some very ingenious views.* He has divided the uterus into three zones; the lower one, the cervical, being the only portion of the uterus narrower than the child, is the only part dilated by the process of labour, and therefore the only part from which the placenta will be detached by that process. So much of the placenta as may be within this zone will and may be detached, but any portion beyond it will not be so necessarily. So far, I think, he is right. Again, we know, as I have already mentioned, that if the hæmorrhage be arrested, it does not always return, from which Dr. Barnes infers that a renewed hæmorrhage is always the result of a new detachment of a portion of the placenta. Carrying this view into practice, Dr. Barnes proposes that the cervical portion of the placenta should be detached, with the hope that the hæmorrhage will cease and not return. He does not advise this plan for all cases, and the cases in which he has tried it are but few. I must refer my readers to his able work for fuller detail; all I will say at present is, that I rather doubt the fact of an old detachment giving rise to no renewed bleeding, and fearing that the artificial detachment of the adherent after-birth might give rise to a severe additional flooding, I should be afraid to run the risk, especially as by the plug, and, when suitable, turning, we have a mode of prompt delivery by which any great increase of hæmorrhage may be avoided. Without denying that it may be suitable in some cases, I should hesitate in recommending it until further experience shall have tested its merits.

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* The Physiology and Treatment of Placenta Prævia, being the Lettsomian Lectures on Midwifery for the Year 1857.

The necessary stimulants and support must be afforded, as in accidental hæmorrhage, and if the patient be extremely sunk and exhausted, we may have recourse to transfusion.

3. Hæmorrhage after Delivery.—A certain amount of blood is always lost after delivery, nor is this injurious; and it is only when it is so great as to produce an impression upon the constitution and the pulse that it is to be considered as flooding. Of course, in all cases it escapes from the mouths of the vessels, exposed by the partial or entire separation of the placenta, not being closed by firm uterine contraction.

It sometimes, but rarely, takes place when an interval elapses between the expulsion of the head and body of the child, but much more frequently after its birth, before or after the expulsion of the placenta. The presence of a clot or a polypus in the uterus may also give rise to it.

The hæmorrhage after the expulsion of the placenta may be the result of want of contraction of the uterus; but there are severe and even fatal cases which are caused by a limited rupture of the cervix.

Dr. F. H. Ramsbotham has recently published a series of very interesting cases, in which hæmorrhage co-existed with severe after-pains, owing, apparently, to the presence of a firm coagulum in the uterus, which it failed to expel. The remedy consists in introducing the hand and removing the coagula.

Dr. Lumley Earle has published a paper and cases showing that distension of the bladder may give rise to postpartum hæmorrhage.*

I have, in the last chapter, spoken fully of retained placenta and its treatment, which I shall not now repeat, but shall confine myself to the treatment of the hæmorrhage, whose effects are similar to those already noticed; but I may be allowed to repeat my conviction that if the means I have advised, and the placenta be thereby expelled, there will very rarely be hæmorrhage after natural labour.

Treatment.—Let us suppose, therefore, that the placenta has been extracted or expelled, but that the flooding is not arrested. The first object is to produce a firm and persistent contraction;

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* Obstetrical Trans., vol. iv. p. 291.

and to effect this, whilst with one hand we firmly grasp the uterus, with the other cold is to be suddenly applied to the genitals by means of cloths dipped in cold water. The advantage of grasping the uterus is, that we thereby secure an artificial contraction, as it were, until the means employed effect a real one.

Ergot should be given at the same time, and in no case is it more beneficial. Cold enemata and cold drinks are also valuable auxiliaries. If these fail, we may pour cold water from a height upon the abdomen, and the shock will generally succeed in rousing the uterus into action. Dr. Tyler Smith succeeded, as a last resource, by injecting iced water into the uterus,* in two cases; and Mr. Chavasse, of Birmingham, speaks highly both of the success and safety of this practice.† Compression of the aorta is said to be effectual in some cases. It was introduced by Saxtorph, and has since been recommended by MM. Lentin, Chailly, and others. Dr. Radford recommends galvanism. When all has failed, Dr. Gooch recommends the introduction of the hand into the uterus, for the purpose of exciting it to contract by the irritation. I have no doubt of its success, but it is more hazardous than the other means I have mentioned. The internal remedies advised in the other forms of hæmorrhage (as lead and opium) are equally suitable to this, whether primary or secondary. The restorative treatment is likewise the same.

In all cases where, after a previous labour, the patient has suffered from hæmorrhage, I am in the habit of giving half a drachm of the ergot of rye, immediately after the birth of the child, and repeating it if necessary. By this means I have rarely failed to protect the patient against a repetition of the accident. It is right to mention that so far from flooding affording the patient any immunity from subsequent inflammation, I should say that it is not very rarely followed by such an attack.

4. SECONDARY HÆMORRHAGE.‡—By this term I understand a loss of blood occurring after the discharge which accompanies delivery has moderated into the ordinary amount of the lochia. It may occur after six, eight, or ten hours, or at any period within the month.

Of 43 cases recorded by Dr. Collins, the discharge occurred within 12 hours in 40, on the 4th day in 1, on the 5th in 1, and

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* Lancet, July 7, 1849, vol. ii. pp. 6, 693.

† Lancet, Dec. 29, 1849.

‡ I have been much indebted to a valuable and learned essay on this subject by my friend Dr. M'Clintock, in the Dublin Quarterly Journal for May, 1851, to which I beg to refer such of my readers as may be anxious for fuller details than I have given.

1 on the 10th day. In 25 cases recorded by Drs. M'Clintock and Hardy, only 1 occurred so late as the 7th day. In 5 cases given by Drs. Johnston and Sinclair, the bleeding occurred on the 4th day in 2, on the 8th in 1, on the 9th in 1, and on the 21st day in 1 case. Dr. Stevenson met with 1 case on the 10th day;* Dr. Fergusson 1 on the 13th.† Dr. Roberton has given 14 cases; in 1 it occurred on the 7th, in 2 on the 9th, in 2 on the 10th, in 1 on the 11th, in 1 on the 12th, in 2 on the 14th, in 2 on the 16th, in 1 on the 19th, in 1 on the 22nd, and in 1 on the 27th day after delivery. In 5 of the cases there was but a single attack; in the remainder the hæmorrhage recurred.‡ In Mr. Campbell's case it was on the 14th day.§

Causes.—The causes are various. The retention of a portion of an adherent placenta, after an operation for its removal; the formation of a firm coagulum, which the after-pains are not sufficient to expel; the relaxation of the uterine contraction within a limited period; local or general disturbance of the circulation; constipation, according to Moreau; disorder of the liver, according to Dr. Ayre; inflammatory ulceration of the cervix, according to Dr. Bennet; polypus uteri, inversion, disease of the body of the uterus, a minor degree of laceration, and thrombus of the cervix uteri.

Any of these causes may give rise to very serious hæmorrhage at an uncertain period after delivery, and the most important point for the attendant, when summoned, is to ascertain to which of these causes it is attributable. The size of the uterus will assist us in deciding the question of the retention of the placenta or a clot, and in most cases some light will be thrown upon the matter by a careful internal examination, added to the previous history. After all, in many cases it is only by the "method of exclusion" that we can arrive at a conclusion as to the nature of the case.

It does not appear that the attack is frequently fatal, except when it is complicated with organic disease. Of Dr. Collins' cases, four died, one of rupture of the uterus, one of sloughing of the vagina, and two from the effects of the hæmorrhage.‖ Of Dr. M'Clintock's cases, two died, one of the effects of the hæmorrhage, and one of uterine phlebitis.¶ None of Dr. Roberton's cases proved fatal; but he relates two from the practice of his colleagues, Mr. Windsor and Mr. Clough, and quotes one from Madame Boivin, which ended unfortunately.*

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* New York Annalist, Oct. 1, 1847.

† New York Journal of Med., Sept. 1850.

‡ Phys. and Dis. of Women, and Mid., p. 365.

§ Med. Gazette, Oct. 26, 1849, p. 732.

‖ Pract. Treatise on Midwifery, &c., p. 158.

¶ Pract. Obs. in Midwifery, &c., p. 236.

Treatment.—Having decided upon the nature of the case, the treatment is not difficult. The application of cold externally, or enemata of cold water, and ergot, are, perhaps, the most valuable means, and the latter will facilitate the expulsion of any portion of the placenta, if loose, or of a clot.

Dr. M'Clintock speaks highly of the use of the plug, but it must be combined with pressure over the uterus, to guard against internal hæmorrhage.

Mr. Slyman proposes an elastic bag introduced into the uterus, and filled with cold water or air, so as to make pressure.†

Tincture of Indian hemp, the oxide of silver, spirits of turpentine, and a blister to the sacrum, are all valuable remedies.

In cases of disease, ulceration, polypus, &c., a selection of these remedies may be used for the purpose of arresting the hæmorrhage; but other treatment will be necessary for those cases, which I have detailed in the volume on Diseases of Women, and need not repeat here. Inversion of the uterus, and its treatment, will also be found in the same volume.

CHAPTER XXI.

PARTURITION.—CLASS III. COMPLEX LABOUR.

ORDER 5. LACERATIONS.

Under this head I propose to treat of rupture of the uterus and vagina, vesico-vaginal and recto-vaginal fistula, and laceration of the perineum.

I. Rupture of the Uterus.—This formidable and very fatal accident has long been known to practitioners in midwifery.‡ It is not, however, confined to the time of parturition, but may occur during gestation, or at a more advanced period of life.

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* Dis. of Women, and Midwifery, p. 365.

† Lancet, Jan. 13, 1849, p. 37.

‡ I would recommend to the attentive perusal of the reader a most valuable monograph on this subject by Dr. J. D. Trask, Amer. Journ. of Med. Sciences, Jan. and April, 1848.

STATISTICS.—The following table will indicate the frequency of its occurrence:—

Authors.	Total No. of Cases.	Cases of Rupture.
Dr. Jos. Clarke	10,387	8
Dr. Merriman	2,947	1
Dr. M'Keever	8,600	20
Dr. Collins	16,654	34
M. Pacaud	4,180	2
Dr. F. H. Ramsbotham . .	68,435	13
Dr. Toogood	1,135	4
Mr. K. Watson	800	3
Drs. M'Clintock and Hardy .	6,634	9
Drs. Johnston and Sinclair .	13,748	17
Dr. Hall Davis	13,783	3
Amsterdam Hospital . . .	7,000	3

Making a total of 117 cases in 154,303 patients, or about 1 in 1318.

I have allowed this table to stand for what it is worth, although some researches, not yet completed, of Dr. M'Clintock have reduced its value by showing that among the cases have been included ruptures of the vagina alone, as well as when there was laceration of both uterus and vagina.

Dr. Burns says that it occurs about once in 940 cases.

It rarely occurs with first children.

Of Dr. Jos. Clarke's cases, 1 was the 2nd pregnancy, 1 was the 3rd, 2 were the 4th, 1 was the 7th, 1 was the 8th, and 1 was the 9th. Of Dr. M'Keever's cases, 4 had 2 children, 5 had 3, 4 had 6, 2 had 7, 2 had 8, and 1 had 9. Of Dr. Ramsbotham's cases, 2 were 2nd pregnancies, 1 was 4th, and 3 were 7th.

Of Dr. Collins' 34 cases, 7 were 1st pregnancies, 6 were 2nd pregnancies, 6 were 3rd pregnancies, 2 were 4th pregnancies, 2 were 5th pregnancies, 5 were 6th pregnancies, 1 was 8th pregnancy, 1 was 9th pregnancy, 2 were 10th pregnancies, and 2 were 11th pregnancies.

Dr. Cathrall's case was a 1st pregnancy.* Dr. Sims' patient had had several children.† Dr. Hooper's case was the 4th pregnancy;[*] Mr. Kite's,[†] the 2nd; Dr. Frizell's,[‡] the 7th; Mr. Powell's,[§] the 1st; Mr. Birch's cases were the 3rd and 4th pregnancies.[||] Mr. Partridge's case was the 7th pregnancy.[¶]

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* Med. Facts and Obs., vol. viii. p. 146.

† Ibid., p. 150.

Thus, of 75 cases 9 occurred in the 1st pregnancy; 14 in the 2nd; 13 in the 3rd; and 37 in the 4th or subsequent pregnancies.

In Dr. Trask's collection 24 cases occurred in the 1st pregnancy; 18 in the 2nd; 17 in the 3rd; 21 in the 4th; 18 in the 5th; 16 in the 6th; 9 in the 7th; 5 in the 8th; 5 in the 9th; 9 in the 10th; 8 in the 11th; 3 in the 12th; 2 in the 13th; and several in the 17th.

CAUSES.—Various causes may give rise to it, and it may happen at different periods.

1. *During gestation.*—That form of extra-uterine pregnancy which is called *interstitial fœtation,* may give rise to it. The ovum, instead of passing direct from the fallopian tube into the uterine cavity, is retained in an interstice of the uterine fibres, where it grows up to a certain point. As it increases, the outer portion of the uterine parietes becomes gradually thinner by absorption (as in the case of abscess), and at length gives way, and the fœtus is precipitated into the abdomen, converting the case into one of ventral fœtation.[**] It may also be the consequence of disease, as in Mr. Else's and Dr. Sparks'[††] cases; from softening, and from abscess in the walls, as related by Duparcque.[‡‡] Any violent accident, such as a fall or a blow, or great fatigue, may give rise to it. It sometimes occurs without any assignable cause; the patient, perhaps, is awakened from sleep by it, as in the cases related by Mr. Scott of Bromley,[§§] and Mr. Glen of Brompton.[||||] It has been attributed to irregular action of the uterine fibres. In a case related by Dr. M'Kinlay, of Paisley, no cause whatever could be discovered. The woman was four months pregnant, the rent was at the fundus uteri, and death from hæmorrhage into the peritoneal cavity took place in a few hours.[¶¶]

2. *During labour.*—*a.* If the uterus have been attacked by inflammation during pregnancy, its tissue may have been so much weakened or disorganized, that the violent contractions which

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[*] Mem. of Med. Society, vol. ii. p. 118.

[†] Ibid., vol. iv. p. 253.

[‡] Trans. of Association, vol. ii. p. 15.

[§] Med.-Chir. Trans., vol. xii. p. 537.

[||] Ibid., vol. xiii. p. 357.

[¶] Ibid., vol. xix. p. 72.

[**] Med. Gazette, vol. ii. p. 400.

[††] Ibid., vol. iii. p. 218.

[‡‡] Ruptures de l'Uterus, pp. 15, 16.

[§§] Med. Repository, vol. vii.

[||||] Merriman's Synopsis—Appendix.

[¶¶] Glasgow Medical Journal, No. 35, Oct. 1861.

take place during labour may rupture it, from the want of consentaneous action in the part affected, or from the pressure of some part of the child against it. Steidele relates a case where rupture occurred in consequence of gangrene.* Dr. Murphy† has published an excellent paper illustrative of this cause of rupture, with cases where the uterus was atrophied, thinned, or softened in texture. Duparcque quotes cases of thinning of the uterine walls, softening, scirrhus, and gangrene. Dr. Trask states that of 49 cases in his collection, where the condition of the uterus was given, in 10 it was healthy; in 14 it was thinned; in 14 softened; in 1 both thinned and softened; in 2 both softened and thickened; in 1 thickened; in 3 diseased. In some cases the seat of the laceration corresponds exactly with the situation of the previous pain. Dr. Tyler Smith believes that in many cases violent uterine action is in itself the cause of rupture; the immediate cause being either emotion or volition, or a reflex or peristaltic action. The period of labour at which the rupture may occur from this cause will vary; it may be at the beginning, before the rupture of the membranes; during the passage of the head through the pelvis, or after the delivery.

b. A certain amount of narrowing of the upper outlet may give rise to it. This is purely a mechanical cause. The head of the child is forced downwards by violent labour pains, but is unable at once to enter the pelvis, from the contraction of the upper strait; now if the pains continue with great power, the head is turned to one side or the other, or posteriorly; and the only obstacle here being the uterine or vaginal parietes, the head is driven through them at the weakest part. They offer the less resistance, probably, from the woman having generally borne several children. In one of Dr. Clarke's cases, the antero-posterior diameter of the upper outlet measured but 3 inches; in two others, 3½. In case 18 of Dr. Douglas, the pelvis measured but two inches antero-posteriorly; and in another case there was a bony ridge at the top of the symphysis pubis, to which the rent corresponded. In one of Dr. Ramsbotham's cases, the antero-posterior diameter was only 2 inches; in another 3 inches; and a third had always had difficult labours previously. In one of Dr. Collins' cases, the same diameter measured 2½ inches; and in several it appeared narrower than usual. Dr. F. Ramsbotham has never known a case in which there was not some contraction. Dr. Roberton collected 37 cases from various sources, in which there was diminution of the pelvic diameters.* Various explanations have been given of the *modus operandi* of this contraction; Dewees attributing the rupture to inflammation and gangrene, Denman to the effect of pressure and attrition, Dr. Burns to pressure of the cervix between the head and the pelvis, and Dr. Ramsbotham to thinning from pressure and inflammation. However this cause may act, it doubtless gives rise more frequently to rupture of the cervix than of any other part. I quite agree with the opinion of Drs. Hardy and M'Clintock, that the effect is more likely to be produced when the amount is slight than when it is excessive. The sex of the child will contribute to the increase of this disproportion—male children having the larger heads. Now, of the 20 cases mentioned by Dr. M'Keever, 15 children were males, and 5 females; and of Dr. Collins' 34 cases, 23 were males. This result of an unusual size of the child's head is still more remarkable when the head is dropsical, as in the cases related by Drs. Campbell, Collins, Lord, Ramsbotham, Chance, &c.

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* Diss. de Rup. in Partu. dolor. Utero.

† Dublin Journal of Med., vol. vii. p. 198.

It occurs at all ages; but the proportional frequency is greater above 30 years of age than previously. Dr. Collins found 1 patient of the age of 16 years, 1 of the age of 21 years, 1 of the age of 24 years, 3 of the age of 25 years, 2 of the age of 26 years, 1 of the age of 27 years, 3 of the age of 28 years, 1 of the age of 29 years, 7 of the age of 30 years, 2 of the age of 32 years, 1 of the age of 33 years, 1 of the age of 34 years, 3 of the age of 35 years, 5 of the age of 36 years, 1 of the age of 37 years, 1 of the age of 40 years.

c. The oblique position of the uterus, or of the child's head at the brim, has been assigned as a cause, from its directing the force of the child's head against the side of the cervix uteri and vagina.

d. Some one of the tissues of the uterus may give way previous to or during labour; perhaps from previous disease; perhaps from some peculiarity of structure; and in some cases, without any appreciable cause. Sir Charles M. Clarke published a case, in which the peritoneal covering of the uterus alone was torn; and similar cases have been since recorded by Mr. Partridge, Mr. White, Dr. Ramsbotham, Mr. Chatto, and Mr. Davis. Dr. Collins has also met with a case of this kind, and others are on record. Dr. Radford published two cases in which the muscular coat was torn, the serous membrane remaining uninjured. Dr. Ramsbotham met with a case nearly similar; and Dr. Collins met with nine such cases. Duparcque relates one, and Velpeau two. Many years ago I assisted at the *post-mortem* examination of a patient, who was attacked with symptoms of ruptured uterus; sudden pain in the abdomen, vomiting, collapse, &c.; and who died in a few hours. We found no rupture in any part, but extensive effusion of blood beneath the peritoneum, covering the uterus, and lining the iliac fossæ—the result, probably, of a ruptured bloodvessel. There were also twelve or fourteen ounces of sero-sanguineous fluid in the peritoneal cavity. Though the extent of mischief is less in these cases, yet they are equally fatal.

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* Phys. and Diseases of Women, and on Midwifery, p. 292.

e. Violence in turning the child may rupture the uterus, and it may accompany this operation, in certain states of the cervix, without any fault of the operator

f. Rigidity of the os uteri, or imperforation, may occasion laceration. There are several cases on record where the cervix uteri has been torn completely off during labour. Steidele, Mr. Scott of Norwich, Dr. E. Kennedy, Dr. Power, Dr. Lever, and Dr. H. Barker,* have each recorded such cases, and I have seen one myself. It appears to be the result of pressure at the brim of the pelvis, rendering the texture of the uterus soft and easily torn.

g. Occlusion, partial or complete, of the vagina has in many cases occasioned rupture of the cervix and body of the uterus, as I have shown elsewhere.

h. It may be caused or aided by the peculiar presentation; but this cannot be very often the case, as, out of 303 cases collected by Dr. Trask, there were only 16 presentations of the shoulder, arm, or side, and 2 of the breech; the remainder were head presentations.

The duration of the labour has been supposed to influence the occurrence of rupture; but Dr. Trask has shown that this is not the case. In 89 cases, 48 were not more than 12 hours in labour; and the average duration of the whole was rather more than 21 hours. In 38 cases the pains were moderate, in 63 they were severe; and in the majority of Dr. Roberton's cases the labour was under 13 hours.

Among the *direct causes* are enumerated blows, falls, anger, convulsions, excessive movements of the child, over-distension, &c. In one case, M. Malgaigne attributes it to the mal-administration of ergot of rye. Dr. Trask gives four such cases.

3. *At an advanced period of life.*—The structure of the

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* Trans. of London Obstetrical Society, vol. ii. p. 239.

cervix uteri is much changed in old age; it becomes close and dense, resembling cartilage, and the canal through it is always reduced in size, and sometimes obliterated. When the outlet for the escape of the uterine mucus is thus closed, it accumulates; and if the quantity be sufficient to distend the cavity, a process of thinning or absorption commences in some part of the walls of the uterus, and proceeds until an opening is made into the peritoneal sac. The same process will take place with any other fluid thus deprived of exit. Duparcque quotes two cases of the kind. In some few cases a similar process has occurred during middle life, as in the case related by Dr. Guzzo of Naples, whose patient was only aged 38.

PATHOLOGY.—If the laceration be the result of disease, it may take place at any part of the organ; the body, fundus, or cervix; and it will generally be found to correspond to the situation of the pain felt by the patient previously. The edges of the rent exhibit marks of disease, the tissue is thinned, softened, and pulpy, breaking down easily under the finger. The colour may be changed to a deep red or brown colour, and occasionally the odour is offensive.

When the laceration is the result of mechanical causes, it generally takes place near the cervix, and involves both the uterus and vagina. It may run along the anterior or posterior surface of the uterus, or at one side. In 6 of Dr. Jos. Clarke's cases, it was on the anterior surface, and in 1, posteriorly. In Drs. Sims and Hooper's cases, it was anteriorly; in Mr. Birch's posteriorly; and in Mr. Cathrall's case, on the right side. In 3 of Dr. Ramsbotham's cases, it was posteriorly; in 1 along the right side; and in another, along the left. Of 23 cases, Dr. Collins found 1 on the right, and 1 on the left side—11 posteriorly, and 10 anteriorly. In Dr. Trask's extensive collection of cases, we find that of those which occurred during gestation, in 7 the laceration was of the fundus, in 1 of the posterior part, in 2 of the anterior part, in 2 of the right side, in one of the left side, in 3 of the cervix and vagina, in 1 from cervix to fundus, in 1 of the cervix, body, and bladder, in 2 of the posterior and inferior parts, in 1 the lower segment of the womb was torn off. Of those which occurred during parturition, 11 were of the fundus, 13 of the posterior part, 14 of the anterior part, 8 of the right side, 7 of the left side, 2 of the vagina, 15 from the cervix to fundus, 2 involving the bladder, 47 at the cervix and involving the vagina and separation from the vagina, 2 of the body, 7 transverse. Thus, of the total occurring during gestation, 13 were of the fundus and body, and 8 of the cervix: of the total occurring during parturition, 63 were of the body and fundus, and 64 of the cervix, involving, more or less, the body of the uterus and the vagina.* In 1 of Dr. Roberton's cases the cervix was separated from the vagina, except a shred, in 8 the laceration was anterior, in 11 posterior, in 5 lateral, in 3 antero-lateral, and in 3 postero-lateral.†

The direction of the rent may be nearly perpendicular, or inclining to one or other side, or running transversely. In these cases the structure of the uterus is scarcely altered; its texture is firm, and its colour natural, except where the blood is ecchymosed. The edges of the rent are jagged and uneven. Occasionally, but very rarely, the bladder has also been torn.‡

When the serous membrane alone is injured, we find numerous small incisions, resembling scarifications, from a quarter to half an inch in length, and one or two lines in depth, or a smaller number of larger lacerations. They are almost always curved, with the convex part towards the fundus, and may be situated on the anterior or posterior wall of the organ. In all the cases hitherto mentioned, more or less blood is found effused into the peritoneal sac, and in many, the usual products of peritonitis.

When the muscular structure alone is injured, it may present either a simple solution of continuity, or evidences of disease. Blood may be found in the cavity of the uterus, and the serous membrane may be inflamed, with the usual results.

The cervix uteri, when separated, has generally a bruised appearance, is swollen, and of a red colour. The edges are ragged and uneven. The canal of the vagina is rendered continuous with that of the uterus, but the connexion between them is not compromised.

When the uterus of an old person is ruptured, from the cause assigned, we shall discover a perforation in some part of it, with a considerable thinning of the walls around it.

In all these cases, with the exception of those in which the cervix uteri is torn off, or the muscular structure alone injured, we find marks of extensive peritonitis, unless the patient die of the shock.

SYMPTOMS.—These vary very slightly, whether the uterus be torn completely through, or whether the peritoneal or muscular tissues alone be injured, or whether the vagina be alone damaged. Certain authors have pointed out what they deem premonitory symptoms; but these are exceedingly ambiguous. The circumstances which may justly excite our fears are, previous difficult labours, the occurrence of partial hysteritis during gestation; and, during labour, the coincidence of violent labour pains with a narrow pelvis.

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* American Journal of Med. Science, April, 1848, p. 393.

† Phys. and Dis. of Women, and Midwifery, p. 312.

‡ Archives Gén. de Méd., vol. xviii. p. 109. Laennec-Piquet. Thèse. Paris, 1822.

Rupture of the uterus and vagina is marked by a sudden, acute, and intolerable pain, like a cramp; a sense of some part bursting, giving way, or tearing, with an audible noise according to the testimony of some patients; the suspension of the labour pains; recession of the head generally; hæmorrhage from the vagina; and a rapidly succeeding state of collapse. Of these symptoms, the excruciating pain and the collapse are the most constant, as in some cases the bursting or tearing is not felt; and when only one tissue suffers, the labour may continue, and there may be no hæmorrhage. The pain continues, with little or no intermission. The stomach is disturbed, and vomiting ensues, at first of the contents of the stomach, then a greenish, and ultimately of a black matter—the "coffee-ground vomit." The countenance is pale and ghastly, with an expression of intense suffering and anxiety; the surface is cold and clammy. The pulse is very rapid, small, feeble, and fluttering, the respiration hurried and difficult; and the patient requires to be raised in bed. There is almost always a discharge of blood from the vagina; sometimes slight, and at others so considerable as to hasten death. We know, also, from *post-mortem* examination, that, in most cases, hæmorrhage takes place into the abdominal cavity; and some authors have attributed the state of collapse to this cause; but though it may aggravate the collapse, we know that this is present when there is no internal hæmorrhage. When the rupture is complete the expulsive efforts cease, because the child escapes, partially or wholly from the cavity of the uterus into the abdominal cavity, where it may be felt by the hand through the abdominal parietes. The presentation, which was probably within reach before the accident, cannot now be ascertained by the finger.

When the rupture is complete, a loop of intestine may escape through it, and give rise to the symptoms of strangulated hernia. Duparcque quotes three cases of this kind from Remigius, Percy, and Beauregard. Dr. Trask collected sixteen cases in which this occurred. A case is related by Dr. M'Keever, where a yard and a half of intestine became strangulated and sloughed off. Dr. M'Clintock* has mentioned a case followed by emphysema of the hypogastric parietes, and other cases have since been published.†

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* Dublin Journal, Nov. 1857, p. 450.

† Med. Press, Aug. 17, 1864.

The state of collapse may continue for some time, if it do not prove immediately fatal; but at length a certain amount of reaction takes place; inflammation sets in, and the patient exhibits all the symptoms of peritonitis—acute pain, exquisite tenderness of the abdomen on pressure, tympanites, decubitus on the back, with the knees drawn up, quick, small, hard pulse, hurried respiration, &c. &c.

TERMINATIONS.—The patient may die of the shock a few minutes or hours after the accident, or after delivery; or she may survive the shock, and die of peritonitis; or lastly, she may be carried off by secondary diseases, as sub-peritoneal or lumbar abscess, &c.

Of Dr. Joseph Clarke's patients—1 died undelivered; 1 in 4 hours; 1 in 20 hours; 2 in 24 hours; and 1 in 30 hours.

Of Dr. Ramsbotham's—3 died shortly after delivery; 2 in 1 hour after delivery, and 1 in 3 days after delivery.

Of Dr. Collins' cases—4 women died immediately after delivery; 1 in 2 hours after delivery; 3 in 4 hours after delivery; 1 in 10 hours after delivery; 2 in 14 hours after delivery; 1 in 17 hours after delivery; 1 in 24 hours after delivery; 1 in 25 hours after delivery; 1 in 30 hours after delivery; 4 on the 2nd day after delivery; 1 the 3rd day after delivery; 4 the 4th day after delivery; 1 the 5th day after delivery; 2 the 8th day after delivery; 1 the 9th day after delivery; 1 the 11th day after delivery; 1 the 14th day after delivery, and 1 the 24th day after delivery.

In a case under my care, the patient died in five minutes, undelivered.

In by far the greater number of cases, the accident proves fatal. Of Dr. Smellie's 3 cases, 2 died; of Dr. Joseph Clarke's 8 cases, 7 died; Dr. Merriman's case died; of Dr. M'Keever's 11 cases, 9 died; of Dr. Ramsbotham's 13 cases, 10 died; of Dr. Collins' 34 cases, 32 died; Dr. Beatty's case died; Drs. M'Clintock and Hardy's 9 cases all died.

Some cases, however, are on record where the patient recovered. Heister relates a case mentioned to him by Rungius; and Spiering, one cured by Forquosa. M. Peu,[*] Dr. Hamilton,[†] Dr. James Hamilton,[‡] Dr. Joseph Clarke,[§] Dr. Douglas,[||] Dr. Labatt,[¶] Dr. Frizell,[**] Mr. Ross,[††] Mr. Kite,[‡‡] Mr. Powell,[§§]

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[*] Pratique des Accouchemens, p. 341.

[†] Outlines of Midwifery.

[‡] Select Cases in Midwifery, p. 138.

[§] Trans. of Assoc., vol. i.

[||] Essay on Ruptures of the Uterus, p. 7.

[¶] Dub. Med. Essays, p. 343.

[**] Trans. of Association vol. ii. p. 15.

[††] Annals of Medicine, vol. iii. p. 377.

[‡‡] Mem. of Med. Soc., vol. iv. p. 253.

[§§] Med.-Chir. Trans., vol. xii. p. 537.

Mr. Birch,* Mr. Smith,† Mr. MacIntyre,‡ Dr. Hendrie,§ Mr. Brook,|| Dr. Davis,¶ Mr. Church,** M. Stobo,†† Dr. Creighton,‡‡ have each recorded one case of cure. Dr. M'Keever and Dr. Collins have each related two, and Dr. Ramsbotham three cases. Duparcque has collected four from French authorities. Osiander states that he has known several cases of recovery. Velpeau quotes several cases.

There are a very few instances on record where the patient has recovered although the fœtus remained in the peritoneal cavity.

In cases of interstitial fœtation also, the patient has sometimes survived both shock and inflammation.

DIAGNOSIS.—The sudden acute pain, the cessation of labour, the collapse, and the recession of the child, will render it easy to recognise the case. But when the rupture is partial, it may be more difficult, and we must rely mainly upon the sudden pain and collapse for our diagnosis. The occurrence of peritonitis subsequently, will serve to clear up the difficulty. In a very able paper in the Dublin Journal, Dr. M'Clintock has shown that the life or death of the child is a valuable diagnostic sign. In cases of laceration the child dies almost immediately. The sudden occurrence of peritonitis in old women may excite a suspicion of its origin, but it will not be easy to arrive at certainty.

PROGNOSIS.—From the details already given, it is almost unnecessary to state that the prognosis is always grave. So very few are saved that there is but faint hope of the recovery of the patient.

TREATMENT.—The first question which presents itself, when a rupture of the uterus is recognised, is "*shall the patient be delivered at once, or left to nature?*" When the os uteri is undilated, instant delivery may be impossible: but in all cases where it is possible, the testimony of experience is in favour of immediate delivery. Dr. W. Hunter and Dr. Garthshore advised that the case should be left to nature; and subsequent to the publication of his Introduction to Midwifery, Dr. Denman came to the same conclusion. The evidence of facts, however, must be allowed to counterbalance even such illustrious names; and that evidence is unquestionably in favour of delivery. Dr. Trask's researches confirm the propriety of immediate delivery, for of those who re-

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* Med.-Chir. Trans., vol. xiii. p. 357.

† Ibid., vol. xiii. p. 373.

‡ Med. Gazette, vol. vii. p. 9.

§ American Journal of Med. Science, vol. vi. p. 351.

|| Med. Gazette, Jan. 17, 1829.

¶ Obst. Medicine, vol. ii. p. 1070.

** Lancet, May 19, 1849.

†† Med. Times, April 6, 1850.

‡‡ Edin. Med. Journal, Aug. 1864, p. 132.

covered, the average time that elapsed between the occurrence of rupture and delivery was under five hours, whilst in those that died it was over five hours. Of Dr. Trask's cases, 154 were delivered by artificial means, 27 died, 57 survived; of 89 abandoned undelivered, 65 died, 24 survived; of 31 delivered by natural efforts, 20 died and 11 survived; of 6 in whom artificial delivery was tried and failed, all died undelivered. Thus, a comparison of those delivered by art with those abandoned undelivered, gives 37 of the former saved, to 27 of the latter in the hundred. But this is not all, for we find that the average continuance of life after rupture in those delivered is twenty-two hours, and in those undelivered, only nine hours.

The *mode* of delivery will depend altogether upon the circumstances of the case.

1. If the head have not receded, and be within reach, or be already in the pelvis, it will be well to deliver with the forceps, if possible; but if not, we must have recourse to the perforator, and with the less hesitation, as Drs. M'Clintock and Hardy have shown that the death of the fœtus almost instantly follows the occurrence of rupture.

2. If the child have escaped into the cavity of the abdomen, or if the brim of the pelvis be much contracted, the hand must be introduced into the vagina, and if practicable, passed through the laceration, and the feet seized and brought down, so that the child may be extracted through the rent. Care must be taken to avoid dragging down or injuring the intestine, in case it should have prolapsed. The placenta is then to be removed, the vagina cleansed, &c. In all these cases the child is born dead.

3. If the uterus have contracted very firmly, it may be impossible to pass the hand through the rent; or the pelvis may be too narrow to admit of the child being extracted footling, or even of the passage of the hand. In such cases we are advised to perform the Cæsarian section, and extract the child and secundines through the abdominal parietes. Successful cases are related by Thibault des Bois, Lassus, Haden, Baudelocque, Latouche and Jopel, Lambron, Glodat, &c. To these may be added cases related by the following:—MM. Coquin,[*] Somner,[†] Ceconi,[‡] Ruth,[§] Rust,[||] Gais, Naegelè, Weinhardt,[¶] Heim,[**] Busch, Demay,[††] Lechoptois et Lair,[‡‡] Velpeau.[§§]

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[*] Bulletin de la Faculté, 1812, p. 86.

[†] Ibid.

[‡] Bulletin de Ferussac, vol. v. p. 47.

[§] Ibid., vol. vi. p. 280.

[||] Luroth, ibid., vol. xix. p. 85.

[¶] Ibid.

[**] Ibid.

[††] Jour. Gen., vol. v. p. 58.

[‡‡] Ibid., vol. i. p. 187.

[§§] Traité d'Accouch., p. 355.

4. This will be the only mode of delivery, in ruptures occurring during gestation, before labour has commenced.

During the stage of collapse, it may be necessary to give stimulants—ammonia, camphor, musk, wine, &c.: but this should be done with great judgment, so as just to attain our object, and no more; bearing in mind that whilst we may be relieving the collapse, we may be aggravating the reaction, and increasing the danger at that period. A large dose of opium may be given after the delivery.

When inflammation sets in, of course the treatment must be actively antiphlogistic. Three or four dozen leeches should be applied over the abdomen, and repeated, if necessary. Large bran poultices are useful, and hip-baths are recommended. Calomel and opium, or opium alone, is the most valuable remedy we possess. It should be given in large doses, or in smaller ones more frequently, so as to influence the system rapidly.

If the rupture have arisen from the narrowness of the upper outlet of the pelvis, and the patient recover, and again become pregnant, premature labour should be induced at such a period of gestation as will allow the fœtus to pass without difficulty. It is of course desirable that the operation should, if possible, be deferred until the fœtus is "viable;" but I do not think this a *sine qua non*, and if we cannot save the child we ought to try to save the mother. Dr. Collins relates a successful case of this kind, in which the patient was delivered the first time after the rupture by artificial premature labour, and afterwards naturally. In Dr. Douglas's case the patient was delivered by turning, the first pregnancy after the accident, and naturally the second. It would, however, be much wiser for the patient to avoid the risk of a subsequent delivery.

II. Laceration of the Vagina.—Dr. M'Clintock has done me the great favour to allow me to give some of the conclusions he has drawn from his researches on the subject. The paper was read before the Dublin Obstetrical Society, and will, I hope, shortly be published.

Meantime, I may state that he finds laceration of the vagina alone much more frequent than we have imagined: that a large proportion of the cases reported as recoveries after ruptured uterus were really lacerations of the vagina; and that laceration of the vagina is a less dangerous accident than rupture of the womb.

In order to show the frequency and comparative mortality, Dr. M'Clintock takes the statistics of the Dublin Lying-in

Hospital from Clarke, Collins, M'Keever, Shekleton, and M'Clintock, as not only are the entire numbers ascertainable as a standard, but that we are sure of having all the cases of laceration. The entire number of "ruptures" was 108, of which 35, or over one-third, were cases where the laceration was confined to the vagina or to the vagina and os uteri. Of these 35 cases, 4, or 1 in 8, recovered; whereas, of the 73 other cases only 4, or 1 in 18, recovered, and in 2 of them the seat of the rent is unknown; in the 3rd, it engaged the vagina and cervix uteri; and in the 4th, the cervix anteriorly.

The following are the chief points of difference Dr. M'Clintock has made out between laceration of the vagina and rupture of the uterus:—

1. The laceration of the vagina takes a circular direction generally.
2. It is not the result of its own contractions.
3. That it is seldom caused by contraction of the brim of the pelvis.
4. That the head of the child is generally in the pelvis when the laceration occurs.
5. That the symptoms to which it gives rise are not so profoundly marked as in ruptured uterus.
6. From the structure of the vagina, the rent remains open and patulous; and hence we find, 1, the escape of the child and placenta into the peritoneal cavity more common; 2, prolapse of the intestine more frequent than when the uterus alone is affected; and 3, that turning is practicable for a longer time after the accident.
7. That premonitory symptoms are rare.
8. That the mortality is less.

Had Dr. M'Clintock's researches been complete, I should have modified some of the statements in the last section; as it is, it will not be difficult for the reader to do so after the perusal of this important abstract.

In a case which came under my own observation, the collapse was not complete, but sufficient to indicate some grievous organic injury. The patient had been delivered by the forceps (before I saw her), during which operation the uterus acted strongly, and afterwards expelled the placenta without assistance. The external hæmorrhage was very moderate, but the collapse, pallor, quick weak pulse, continued for four or five days, and then suddenly increasing, ended in death. On examination, *post-mortem*, we found that the vagina had been ruptured at its junction with the uterus, that a large sac filled with blood had thus been formed, covered at its upper part only by the peritoneum, and that this covering had given way probably at the time when the collapse became complete, and a large quantity of blood had then been effused into the peritoneum, but that, for want of time, peritonitis had not set in.

III. Vesico-Vaginal and Recto-Vaginal Fistulæ.—Perforation of the coats of the vagina, anteriorly or posteriorly, with the subjacent organs, the bladder or rectum, is not very rare, and is one of the most distressing and intolerable accidents to which females are subject; and the more so, as a cure is but seldom effected. Indeed, vesico-vaginal fistula has until lately been considered as one of the *opprobria* of surgery; and, with some exceptions, the cure has been given up as hopeless.

1. Vesico-vaginal Fistula. — Vesico-vaginal fistulæ are more frequent than perforations of the rectum; they are generally found separately, but in some cases co-exist. A case was received into the Meath Hospital some years ago, in which the bladder and rectum were both perforated, the perineum lacerated, the canal of the vagina distorted by cicatrices, and closed at its upper part by adhesions. Strictly speaking, we can hardly consider this form of laceration a complication of labour, it is rather one of its sequelæ, except in those unfortunate cases where the injury is inflicted during extraction of the child, or the urine is allowed so to accumulate as to expose the bladder to rupture from the pressure of the child's head.

Causes.—Various *causes* may give rise to this accident.

1. Either wall of the vagina may be wounded, accidentally or on purpose, by cutting instruments. Such has been the result of criminal attempts to procure abortion. In these cases, however, a cure often takes place spontaneously.

2. The long retention of a pessary in the vagina may give rise to inflammation and ulceration of the vaginal tunics, and ultimately to perforation of the bladder or rectum. This, however, but seldom occurs, and then only in aged females, for whom little can be done in the way of cure.

3. In powerless or difficult labours, where the head of the child is long retained in the pelvis, or where by its size it makes great pressure, the vagina may be the seat of inflammation, ulceration, and perforation, involving either of the subjacent organs, but much more frequently the bladder. In these cases, the vagina is frequently narrowed, or deformed by irregular, circular, or

spiral cicatrices, rendering the detection of the fistula somewhat difficult.

4. A maladroit use of instruments may occasion this injury. Cases of both kinds of fistula could easily be adduced from authors, as the result of carelessness or incompetence of the operator.

5. Retention of urine during labour will generally involve more or less pressure upon the bladder; if within certain limits, perforation will be the result of subsequent inflammation; if the distension be excessive, and the bladder protrude into the pelvis, so as to be pushed before it by the descending head of the infant, then rupture of the bladder and vagina may take place. A very curious case was related to the London Obstetrical Society by Dr. Robert Barnes of a fibrous tumour in the anterior wall of the uterus, which was jammed against the symphysis pubis, closing the urethra and giving rise to retention of urine and rupture of the bladder, of which the patient died.*

6. The bladder is occasionally lacerated in rupture of the uterus, though there may not necessarily be a perforation of the vagina.

7. In corroding ulcer and cancer of the uterus, the ulceration may involve either or both walls of the uterus, and perforate the bladder or rectum, or both. For these cases, however, nothing curative can be attempted.

8. A pelvic abscess may open into the bladder, uterus, or rectum, or into more than one of these cavities, and the opening may remain fistulous, as in the cases published by Sir James Simpson.†

The *situation* of the perforation is of great importance in the cure of vesico-vaginal fistulæ. It may be at the junction of the urethra with the bladder—in the neck of the bladder—or in some part of its body. The opening may be more or less circular in form, or it may be a rent running longitudinally from before backwards or transversely. The curability of the fistula will depend, in a great degree, upon its being attended with the loss of substance or not.

Symptoms.—These depend *primarily* upon the causes of the fistula, and will vary accordingly; and *secondarily*, upon the escape of the contents of the wounded organ. Whichever organ be wounded, the result is inexpressible distress to the patient. The escape of urine is attended with so marked and irrepressible an odour, that the patient is placed "*hors de société*." Obliged to confine herself to her own room, she finds herself an object of disgust to her dearest friends, and even to her attendants. She lives the life of a recluse, without the comforts of it, or even the consolation of its being voluntary. It is scarcely possible to conceive an object more loudly calling for our pity, and strenuous exertions to mitigate, if not remove, the evils of her melancholy condition. In addition to the offensive smell, the escape of the urine gives rise to the excoriation of the vagina, external parts, and thighs. The flow of urine is constant when the neck of the bladder is the seat of the injury, and at intervals when the wound is situated more posteriorly.

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* British Med. Journal, Sept. 5, 1863, p. 275.

† Obstetric Works, p. 232.

In all cases a careful examination should be made, by passing a catheter into the bladder, and a finger into the vagina; then placing the points of both in apposition, the whole posterior surface of the bladder should be passed over, and carefully examined. At some one point the finger and catheter will come in contact; the catheter may then be passed into the vagina, and the extent of the damage ascertained. Dr. M. Sims' speculum will generally afford us an accurate view of the opening, and enable us to ascertain not merely the extent of it, but the condition of its edges. When the vagina is not cicatrized, it is not generally difficult to obtain the information we desire; but when deformed by cicatrices, it will require both care and patience.

In the majority of cases, little is to be hoped from the efforts of nature; the borders of the wound become thickened and callous, and the case remains stationary during the patient's life. In some few cases, however, the result is more favourable—as, for instance, when the wound has been inflicted by a sharp instrument. In two cases under my care, where the wound was precisely at the insertion of the urethra into the bladder, and was followed at first by absolute incontinence of urine, a cure was obtained naturally. The wound slightly contracted, without healing, and the muscular fibres of the bladder assumed the office of a sphincter muscle, and closed the orifice, so that the patient could retain urine almost as long as previous to the accident, and could evacuate it at pleasure.

TREATMENT.—We cannot wonder that many methods should have been tried to remedy so offensive an accident, nor that so few should have succeeded, when we recollect the obstacle presented by the constant passage of urine. The probability of relief depends partly upon the situation, and partly upon the character of the fistula. When it is far back in the posterior wall of the bladder, and when there has been much loss of substance, a cure is seldom obtained; but when near the neck, we may frequently succeed.

I shall now notice the principal plans which have been proposed.

1. *Dessault's method*,* as it has been called, consisted in maintaining a catheter constantly in the urethra, so as to afford an outlet for the urine, and at the same time preventing its escape, by plugging the vagina. J. Cloquet has added a kind of syphon to the catheter. Chopart succeeded in curing a case by this means, where the wound was in the neck; but he failed in one where it was in the body of the viscus. Peu,† S. Cooper, and Blundell, each relate a case of cure. There is no doubt that much relief may occasionally be derived from this plan. I had a case in which the patient was ultimately enabled to retain her urine for two hours, without dribbling, though the wound did not entirely close; but in some of the cases on record the wound completely healed. There is this objection to the plan, however, that in many instances the patients cannot bear the catheter above an hour at a time. I saw two examples where this circumstance proved a serious obstacle to the cure.

2. *Cauterization.*—This is obtained by the repeated application of the nitrate of silver, or the strong acids. Dupuytren, who I think first proposed the plan, used the "nitrate acide de mercure," or nitrate of silver. Relief has occasionally been afforded by this means, but a cure is very rarely, if ever, effected. When there is much loss of substance, it affords no chance. I have seen it fail more than once. However, Dupuytren, and Delpech, and Baravero, are said to have thus cured several cases. The best mode of applying the caustic is by means of a fenestrated speculum, which will leave the upper surface of the vaginal canal exposed, or by Lallemand's "porte caustique." The caustic should be lightly applied, as the object is not to produce a slough, but merely a contraction.

3. *Actual Cautery.*—If the loss of substance be slight, and the wound small, there is no doubt that a cure may be obtained by this means.‡ Dupuytren, who first proposed it, cured several;§ Dr. M'Dowell, one;‖ Dr. E. Kennedy, two;¶ Mr. Liston, four or five;** and others have been equally successful. Dr. Colles has tried it successfully where the orifice was not too large, but without benefit where the fistula was extensive. I witnessed a

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* Œuvres Chirurgicales, vol. iii. p. 299.

† Prat. des Accouchemens, p. 384.

‡ Jeanselme, l'Expérience, Jan. 1838.

§ Sanson: Path. Med.-Chir., vol. v. p. 294.

‖ London Med. and Phys. Journ., 1831.

¶ Dublin Journal of Med. Science, vol. ii. p. 241.

** Lancet, June 23, 1838.

successful case treated by Dr. O'Ferrall, of St. Vincent's Hospital. I also tried it in a case under my own care, but it failed, as I anticipated, on account of the large size of the opening.

The facility with which the operation is performed will depend upon the situation of the fistula being more or less anterior. The patient may be placed upon her back, as for lithotomy, or upon her knees and elbows. Dr. E. Kennedy adopted the former; but I have found the latter far more convenient, and I think less offensive to the patient's feelings. The light can reach the part more readily, and the position of the operator is more convenient. The patient must be placed before a window, or a candle must be used. The next point is to dilate the vagina, so as to ensure access to the wound, without contact with the vagina. This may be done by three brazen spatulæ, sufficiently long to reach beyond the rent, and broad enough to protect the vagina—or by a double-bladed speculum. I have also used, with great facility and safety, a metal cylinder, closed at its extremity, but with an opening in the side, a little distance from the end, and corresponding to the fistula. A catheter should be passed into the bladder, and through the fistula, to guide the operator, and to keep the mucous membrane of the bladder from protruding. Having these preliminaries adjusted, the cauterizing iron, at a white heat, should be *lightly* applied round the *edges* of the wound, and withdrawn. The dilators or speculum may then be removed, and the patient placed in bed. If it do not occasion irritation, it will be advantageous to allow the catheter to remain in the bladder. An improvement upon the cauterizing iron has been lately introduced by Mr. Marshall, who has employed galvanism to produce sufficient heat. The instrument being applied before the circuit is completed, the operation is quicker and yet more exact.* Mr. Marshall has found it very successful. The patient should be kept quiet, and the bowels freed by medicine. A certain amount of local irritation generally succeeds, which subsides in the course of a few days; after which the operation may be repeated as often as necessary. The operation should not produce a slough, or the patient will not be benefited, but merely a corrugation or shrivelling of the edges. If we thus reduce the wound, so as to bring the edges in contact, adhesion may then take place, and the patient be cured. But it must in candour be confessed that whilst it is not difficult or uncommon to benefit the patient to a great extent, a complete closure of the fistula is very rare.

4. *The Suture.*—This method is said to have been invented by

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* Med. Times and Gazette, July 2, 1853.

Roonhuysen; at all events, it has been long known and practised by the profession, with varying results. Of late years it has been repeatedly performed; with success by Dieffenbach, Blandin, Chanam, and Jobert;* by Sanson, who failed; Deyber, who nearly, if not quite, cured his patient; Malagodi of Bologna, who has published his successful case; by MM. Lallemand, Dugès, and Roux, who failed; and by M. Naegelè. Mr. Earle cured three cases by this means. Mr. Hobart, of Cork, formerly published a successful case,† and since states that he has perfectly cured at least ten by the suture. He says: "In reply to your letter, I have only to say, that many cases of vesico-vaginal fistula came before me within the last fifteen years, many of whom were cured, some relieved, and others not at all benefited. I think there were from ten to fifteen *perfectly* cured, and all by the same means." A successful case is related in the American Medical Recorder.‡ Dr. Evory Kennedy has succeeded in diminishing the orifice several times; and in one case in which the twisted suture was used, the cure was complete. More recently Drs. Maurice Collis, Beatty and Sawyer, have been repeatedly successful, adopting, with some modifications, the American mode of operating. Mr. Hayward, of Boston, U.S., has published a very interesting case, which was perfectly successful.§

On the other hand, the late Dr. Colles of Dublin (whose name alone is a sufficient guarantee for all that science, and skill, and care could do), allowed me to state that he has repeatedly tried the common interrupted suture, but though he has by this means lessened the orifice, he has never succeeded in closing it entirely: and this was the result under very favourable circumstances. He has also seen very unpleasant consequences result from the operation: hæmorrhage (the edges of the fistula having been removed by the knife) to a great amount: fever, hectic, &c.

The usual mode of operating was as follows:—The edges of the wound were renewed, either by paring with a knife or the application of caustic: the latter being less liable to occasion subsequent hæmorrhage. When this was accomplished, the patient was placed on her back or knees, and the vagina dilated. If the wound be near the insertion of the urethra, or can be brought down by passing a catheter through it, a curved needle (rather shorter than usual) may easily be passed through the opposite edges. If the wound be further back, an instrument must be used to pass the suture. Mr. Hobart fixed a curved needle at the end of a canula, by means of a piece of wire with a hook at the end of it, running through the canula. The needle is passed through the hook, and held firm by it. M. Naegelè has contrived a needle with a long handle for passing the ligature. He has also invented a species of scissors, for the purpose of paring the edges. Mr. Beaumont has described an ingenious instrument for passing the sutures: "The instrument is in the form of a forceps, one blade of which is a needle, curved towards its point, close to which is its eye. The other blade is broader on its opposing surface, less curved, and at its extremity has a hole through which the needle-point, and just the loop of the ligature, are carried, when the blades are closed. On the back of the broad blade is a spring, through which, when pushed forwards, the blades being previously closed, catches the ligature on its point, and holds it. In using this instrument, the operator has only to seize in its points, in the same manner as he would with a pair of forceps, the border of the fistulous opening; the blades should then be closed, and the ligature will be carried through one lip of the aperture. The opposite border is then to be seized, and the blades to be closed, and held so. The spring on the back of the broad blade is now to be pushed forwards, by which the ligature is caught, and held at its pointing. The blades are then to be opened, and gently withdrawn, leaving a double ligature passed through opposite points of the fistulous aperture, so that a common or quilled suture may afterwards be formed."* Mr. Beaumont used it once with a quilled suture.

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* Lancet, May 12, 1838.

† London Med. and Phys. Journal, vol. v.

‡ April, 1826, p. 410.

§ American Journal of Med. Sciences, Aug. 1839.

Dr. Maurice Collis has proposed and tried successfully the separation of the mucous membrane surrounding the opening, to the depth of a quarter of an inch, and inserting the ligatures through the vaginal flaps. The new surfaces thus laid bare, are everted, and brought into contact. In several cases perfect union followed. He used the quilled suture, and removed the ligatures on the fifth day.

It will generally be necessary to pass several sutures, none of which should be tightened till all are inserted, and, when tied, the ends should be cut off. The tightening is easily accomplished with two pair of dressing forceps. M. Jobert has found it advantageous to make an incision through the coats of the vagina, either longitudinally, or anterior to the cervix uteri, or at its orifice semicircularly, so as to diminish the strain upon the ligatures. When this is done, the dilator or speculum may be removed, and the patient put to bed, and opium given to confine the bowels. There is considerable soreness and pain complained of, which may be relieved by vaginal injections of warm water twice a day. When the edges of the wound have been pared, we must be on the watch against hæmorrhage. Should it occur, cold injections may be thrown up, or a plug inserted, and, if necessary, the sutures divided. The sutures generally come away about the eighth or tenth day, and we are then able to ascertain the result of our operation, which, if not wholly successful, may be repeated after a week's interval.

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* Med. Gazette, Dec. 3, 1836, p. 355.

M. Naegelè has described an instrument, consisting of two small plates, joined at the back like the pages of a book, and fixed in a handle of steel. The anterior edges are brought together by a screw fixed in the handle, and, the edge of the wound being included, are retained in apposition, and the lower part of the handle removed.[*] M. Lallemand has also invented one, which he calls a "sondeerigne," by which a similar effect is produced,[†] but not having seen the instrument, I am unable to give a description of it. He has cured one case with it, partially cured another, but failed twice. MM. Langier and Lewziski have also contrived similar instruments.

Dr. Marion Sims'[‡] mode of treatment from its success deserves a more detailed description. In three particulars he may claim complete originality — the position of the patient, the duck-billed speculum, and the silver wire sutures. The patient should be placed on a mattrass laid upon a table, in a strong light, and lying on her left side, but with the left arm passed behind her back, and the body from the hips upward turned forward, so as to bring the chest in contact with the bed. This position is easier to the patient than any other, and admits of the exhibition of chloroform. The speculum is then to be introduced and pressed backwards, so as to expose the whole anterior half of the vagina, with the fistula. Generally the view is most satisfactory, and the speculum only occupying the posterior portion of the vagina, there is room enough for the operator. Before proceeding it will be well to determine upon the best mode of bringing the edges together, whether transversely, vertically, or obliquely, and as to the quantity of "materiel" at our command; and then Dr. Sims pares the edges all round either with a knife or pair of fine scissors, removing more of the vaginal than of the vesical edge. The next step is the insertion of the sutures, which should always be sufficiently numerous. Small fine needles, with thread to which silver wire is attached, are to be held in a pair of forceps made for the purpose (the best "porte-aiguille"), and then inserted at a little distance from the edges, and brought out through the raw surface, so as not to penetrate the bladder, and passed through the opposite side in like manner.

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[*] Erfahrungen und Abhandlungen, &c., p. 389.

[†] Velpeau: Méd. Opératoire, vol. iii.

[‡] Anniversary Discourse before the New York Academy of Medicine.

Having introduced as many as he deems necessary, Dr. M. Sims next proceeds to tighten them by twisting the wire so as to bring the edges in close contact, but not too tightly, and the operation is completed by snipping off the sutures near to the twisted portion. Formerly Dr. Sims used a split shot to fasten the wire, but now he prefers twisting it. The patient is then placed in bed, and a curved metal catheter left in the bladder, which, however, requires changing and cleaning every day. The ligatures should be left in eight or nine days, and they may be left so long as we please. I must refer to Dr. Sims' paper, for the description and plates of the instruments he uses. If after the sutures are removed, urine still escapes, we must examine carefully to be sure that it is not by the urethra, as a certain degree of incontinence remains for some time, in many cases. If any portion of the fistula be not healed, the operation must be repeated after the patient has recovered, nor need we be discouraged by a failure, for Dr. Sims, Dr. Bozeman, and Mr. B. Brown have recorded cases which required many operations before they were cured.

Dr. Bozeman's* operation differs little from Dr. Sims', except that instead of twisting the wire, he passes both the ends through a row of holes in a small lead plate, or button, and fastens them by shot or a little saddle of lead. This object, however, is attained better by making a double row of holes, as suggested by Dr. Hardy, and twisting the wire across the intervening bar. Some of his special instruments are very ingenious. Sir James Simpson has proposed a circle or oval, of twisted wire, as allowing more play than the solid button; and he introduced, if he did not invent, a new needle for passing the wire, as well as the substitution of annealed iron wire for silver.

Minor changes have been made by Dr. Battey,† and other operators, which are not of essential consequence.

5. Dr. Blundell saw a fistula in the neck of the bladder, near the urethra, cured by laying open the urethra to the rent, and then healing it up, as is done in the ordinary fistula. Mr. Porter,

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* Remarks on Vesico-Vaginal Fistula, &c., by N. Bozeman, M.D.

† Trans. of Obstetrical Society of London, vol. i. p. 275.

of the Meath Hospital, performed a similar operation, which terminated successfully.

6. "*Elythro-plastie.*"—This name is given to the operation by which a portion of the integument is taken from a neighbouring part, and applied to the vesico-vaginal fistula, and retained by sutures; the old connexion being maintained until union has taken place. It is exactly similar to the rhinoplastic operation for repairing noses. It was suggested by Velpeau, but first practised by Jobert. Of his four operations, one patient was cured at once, one by a second operation, one died, and with one it failed. M. Roux did not succeed with it. I am not aware that any other surgeon has tried it.

7. *Closure of the Vagina.*—When using the caustic for the cure of vesico-vaginal fistula, in the year 1833, M. Vidal de Cassis chanced to touch the vaginal mucous membrane with it; this caused considerable inflammation, and on making an examination subsequently, he found the sides of the vagina adherent. The patient also observed that the dribbling of urine had entirely ceased. Unfortunately, a careless examination was afterwards made, and these adhesions were destroyed. But the hint was not thrown away, for on the next occasion, in the same year, M. Vidal de Cassis attempted to relieve the fistula in this way, and was perfectly successful, until the clumsiness of an assistant destroyed these adhesions also. There is no doubt that in many cases this would be found a valuable means of relief. Caustic of any kind will answer the purpose of exciting inflammation, though adhesion may not always take place. I have seen a circle of the mucous membrane removed, and the parts brought together by suture, for the purpose of closing the orifice of the vagina, but union did not take place.

When we have recourse to this method, care should be taken to leave a very minute opening for the escape of the menstrual fluid, if menstruation have not ceased.

8. *The Plug.*—If none of the means hitherto described afford a probability of cure, or fail upon trial, it is at least a comfort to know that we can still remove a portion of the distress caused by this frightful complaint, provided the irritability of the vagina be not too great to bear a plug.* Various cases of relief by this means are on record. Dr. Gooch, in 1814, suggested to Mr. Barnes, of Exeter, the employment of an india-rubber bottle, of sufficient size to fill the vagina, and having upon one side of it a small piece of sponge, to be applied to the fistulous opening. Mr.

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* Davis's Obstetric Med., vol. i. p. 128.

Barnes used this with great benefit to his patient.* M. Dugès has proposed a similar plan, but the pessary was made of different materials.† Dr. Evory Kennedy has succeeded in taking casts (with wax) of the vagina, with the fistula, in several cases: and from them he made moulds, and had caoutchouc bottles cast in moulds. These were large enough to fill the vagina, and to close both the fistula and the outer opening, so as entirely to prevent the escape of urine. I have attained the same object by means of a piece of sponge covered with thin bladder. It should be large enough to fill the vagina, and of a suitable shape. A narrow neck, of the dimensions of the vaginal orifice, is to be formed, by wrapping it with twine, which is to be covered with lint. The whole has much the shape of an egg-cup. It should be dipped in oil previous to being used, and then it can easily be introduced, and the stalk filling up the external orifice, no urine can escape. It can be removed and replaced by the patient herself. Various other suggestions have been made, but either of these plans will relieve the patient from the constant dribbling and offensive odour, and will allow the excoriations to heal. If the patient cannot pass water with the plug *in situ*, she should learn to withdraw it and re-introduce it herself. Dr. Burns says that "Dr. Balmanno showed me a patient who derived much comfort from having a hollow tin globe, like a pessary, inserted into the vagina. It was perforated at the upper part, like a pepper-box, and from the under part a catheter descended, which entered into a flat flask, suspended between the thighs. Little or no urine escaped by the vagina."

2. VESICO-UTERINE AND VESICO-UTERO-VAGINAL FISTULA. —M. Jobert, in his work,‡ has entered very fully into some variations from the ordinary vesico-vaginal fistula, to which it is right that I should briefly allude. The first of these is the *vesico-uterine*—when the opening is directly from the bladder through the uterine parietes, without injury to the septum between the bladder and vagina; and the second—*the vesico-utero-vaginal*—in which there is a fistulous communication between the bladder, uterus, and vagina.

Neither form is very common. Dr. Bozeman doubts the occurrence of vesico-uterine fistula; but having treated one myself I am quite certain that the opening was through the cervix, and not through the parietes of the vagina. Mr. James Lane§ has since published a case with a plate, and he has succeeded in finding four cases recorded by Madame Lachapelle, Professor Stolz, Sir James Simpson and Dr. Leishman, and some by M. Jobert.

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* Med.-Chir. Trans., vol. vi. p. 586.

† Duparcque: Ruptures de l'Uterus, p. 339.

‡ Traité des Fistules vesico-uterines, &c. Paris, 1852.

§ Med. Times and Gazette, Jan. 10, 1863, p. 26.

The extent of destruction in either case varies very much; there may be a small perforation with smooth edges, a ragged wound, or very extensive destruction of the parts involved.

CAUSES.—In the majority of cases, so far as we know, the method of production is mechanical in the first instance. A large fœtal head, a tight pelvis, or a prolonged second stage of labour, may give rise to inflammation and sloughing from pressure, and if the cervix uteri have been brought down before the head into the pelvis, pressure on this part may determine the complication of the uterus with what would otherwise be a simple vesico-vaginal fistula. No doubt that the awkward and violent use of instruments may also inflict this injury.

Sir James Simpson has shown, however, that vesico-uterine, vesico-rectal, and utero-intestinal fistulæ, may be the result of a very different cause—viz., of pelvic abscess opening into the bladder and uterus, the bladder and rectum, or the uterus and some part of the intestinal canal. The cases he relates are very interesting, and that of vesico-uterine fistula the more so, from a cure having apparently taken place from spontaneous contraction of the openings.*

SYMPTOMS.—Perhaps in the first instance nothing but a *post-mortem* examination could have made us fully acquainted with the real nature of vesico-uterine fistulæ. No one could doubt that there was a urinary fistula somewhere, but neither finger nor speculum could detect any, because the vaginal canal was perfect; but now we are aware of its existence, it is by no means so difficult to detect. It is found that the urine escapes continuously when the patient is lying down, less, and at intervals, when sitting and inclining, and still less when standing, which is not the case with any other variety of urinary fistula. With the speculum we may occasionally observe the urine escape through the os uteri, and if, at the same time, an injection of milk be thrown into the bladder, we may observe its escape by the same way. Moreover, I found that passing a silver catheter into the bladder, and a sound through the os uteri, with a little manipulation I could "click" the one against the other.

Vesico-utero-vaginal fistulæ present the same symptoms as the more simple vesico-vaginal fistulæ, only that, on examination, we find a greater extent of destruction, the anterior lip of the os uteri being more or less destroyed. The urine escapes in every position, and the catamenia are discharged mixed with the urine.

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* Edin. Monthly Journal, Dec. 1852, p. 532.

The *prognosis* is more serious, inasmuch as the uterus has participated in the injury; it is possible in either variety, but especially in the first, that the sloughing may extend so far as to compromise the life of the patient.

Treatment.—1. *Prophylactic.*—It is as yet an unsettled question how far we may be able to prevent so melancholy a consequence of labour. When we recollect that the cause is, first, pressure of the cervix between the head of the child and the symphysis pubis, and secondly, general pressure of the vaginal parietes from the head being too long detained in the pelvic cavity, we cannot doubt that, in some cases at least, we have the remedy in our own hands. If, when the os uteri is dilatable, the anterior lip be gently pushed up above the head during an interval, and maintained there during a pain, it will escape injurious pressure; and this is not difficult to accomplish. Again, a labour prolonged in its second stage, so much as to occasion inflammation and sloughing, will generally be found to have exceeded the period when assistance becomes necessary, and if the forceps be admissible, they will be safer in careful hands than the delay. When the forceps cannot be used, the alternative is either further delay or craniotomy; the former of which may incur the risk of this injury, which should therefore always be taken into consideration in our decision.

2. *Curative: a. Vesico-uterine fistula.*—An attempt has been made, by plugging the canal of the cervix uteri, and keeping a catheter constantly in the bladder, to prevent the passage of the urine through the wound, and so afford it an opportunity to heal. Again, it has been advised to apply the nitrate of silver to the fistula, and in Sir James Simpson's case it succeeded. One of M. Jobert's plans is as follows: he dissects off the reflected vagina from the anterior lip until he arrives at the fistula, the borders of which are to be refreshed with the bistoury, and sutures applied in the situation most suitable to the direction of the wound. A second method consists in an attempt to close the communication between the uterus and vagina, leaving open that with the bladder, by first dividing the cervix laterally, then dissecting the vagina from the anterior lip, and uniting it by section to the posterior lip. He gives a case of complete success by this latter process.

A similar cure seems to have taken place naturally in Dr.

Leishman's case;* and Mr. Lane, adopting Jobert's plan, was also successful. Dr. Simon† has also recorded a successful case. I had previously performed the same operation; and though I cannot say that the os uteri was absolutely closed at the time, I have heard since that the lady suffers no inconvenience now from incontinence. In these cases the menstrual discharge escapes through the bladder, and of course she is permanently sterile, but then it is not likely that she could conceive as long as the urine flowed through the cervix; and if this be the only feasible method, of course the argument is equal on both sides.

b. Vesico-utero-vaginal fistula.—In this complication M. Jobert proposes three different operations. The first consists in dissecting off the vagina from the remains of the cervix, then paring the borders of the fistulous opening, and lastly in uniting by suture the remains of the cervix with the edges of the vesico-vaginal opening; the second, in dissecting off the vagina from the cervix, in dividing this latter at each side, and after refreshing the edges of the fistula, in uniting by suture the posterior lip of the os uteri to the edges of the fistula. The third differs only in a depression being made in the anterior lip to fit more accurately the edges of the vesical fistula.‡ If necessary, incisions may be made laterally in the vagina, or semicircularly at its orifice, to relieve the strain upon the ligatures. M. Jobert gives the details of four cases, three of which he states were cured.

Before quitting this subject, it may be interesting to mention a case of *laceration of the urethra* from its insertion into the bladder to its orifice, which occurred during a delivery by craniotomy. The results were as distressing as in vesico-vaginal fistula; not a drop of urine could be retained. Finding that there was abundant material, I pared the edges obliquely, *i.e.*, removing more of the vaginal mucous membrane than the urethra, and inserting eight or ten silver wire sutures, I drew the edges together, over a moderate-sized catheter, which was left in the bladder. Union took place at once, except in a small space near the bladder, and this healed after a second operation. She is now (two years after the operation) quite well, and has gradually recovered the command of the bladder.

IV. RECTO-VAGINAL FISTULA.—There can be no doubt that recto-vaginal fistulæ are less frequent, and more easily cured, than those fistulæ which involve the bladder. There are a few cases, but very few, on record, where this defect was congenital; most commonly it arises from causes connected with labour, as in the case of vesico-vaginal fistulæ—that is, from too prolonged pressure of the child's head giving rise to inflammation and sloughing, or from the awkward use of instruments, and in addition it may occur as a laceration; or from disease of the rectum, or from a pelvic abscess. This injury may exist alone, or it may be combined with a vesico-vaginal fistula. The extent, situation, and direction of the wound may vary to any extent, but in almost every case the sphincter ani is uninjured. When we examine the parts, the mucous membrane of the vagina and rectum is red and congested, the mucous follicles unusually developed, and the septum thickened when the injury is recent, but when of long standing, the edges are hard and cicatrized.

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* Glasgow Med. Journal, Oct. 1861.

† Monatsch. für Geburtskunde, July, 1858.

‡ Traité des Fistules, &c., p. 70.

Symptoms.—The edges of the wound, at least when recent, secrete a certain quantity of matter, which is discharged by one or other outlet. When very recent, the vagina may be found inflamed to a greater or less extent, and giving rise to a purulent discharge. But the characteristic symptom is the escape of air and fæces through the vagina, which, however, may be modified by various circumstances. When the fistula is small or oblique, air may escape, but the fæces will be retained unless they are very fluid. Unless the opening be direct and large, solid matters are rarely passed, but their presence at the orifice is a continual irritation. When the opening is of sufficient size, fæcal matters and gas escape involuntarily, and the condition of the patient is most pitiable. Even if the bodily injury did not affect her health, her distress of mind, in addition, is generally sufficient to do so; she is cut off from society, and, in the solitude of her own sufferings, her spirits and health are apt to deteriorate.

In some cases, however, matters do not become so desperate, although such instances are not common. For example, when the injury is small in extent, and the result of laceration rather than sloughing, it may heal with quiet and care; or, if small, it may be closed by granulations or by the formation of something like a flap or valve. I had a patient who had a small recto-vaginal fistula for several years, through which nothing passed unless she took physic or had a diarrhœa, and from which she suffered very little annoyance.

Treatment.—The methods of cure do not differ much from those I have enumerated for vesico-vaginal fistula; they are, however, more easily applied. These are—1, cauterization; 2, compression; and 3, the suture. Whichever we try, we must remember that the entire fistulous opening must be included.

When the fistula is small, cauterizing by the acid nitrate of mercury, nitric acid, nitrate of silver, or the actual cautery, has succeeded in the hands of Dupuytren, Amussat, and others; and if it fail, we may pare the edges of the wound from the rectum to the vagina, and apply sutures, with quiet and absolute rest. Cases of cure by these means have been recorded by Noel, Saucerotte, Fielding, Portal, Mott, &c. &c. M. Cullerier, sen., proposed compression, and invented an instrument for the purpose, which he said succeeded; but it seems to have failed in other hands. The insertion of a seton has been tried by Dr. Barton, of Philadelphia, in the case of a recto-vaginal fistula following an abscess, and with success; but it can only be suitable in very rare cases.

As M. Jobert observes, although some of all these methods may succeed when the opening is moderate, there remains a class of cases in which they must fail, because of the extent of the mischief. For such cases he has proposed a plan, which he terms "*autoplastie par glissement*," which consists in renewing the edges of the fistula, in the insertion of the interrupted suture, in relaxing the surrounding tissues by incisions, and in appropriate regimen. The patient being placed on her back, with the thighs drawn upwards, the superior wall of the vagina is to be raised by a univalve speculum, and the lower depressed so as to bring the fistula into view. Its borders are to be removed by the knife, and three or four sutures, according to the extent of the opening from the rectum to the vagina, inserted through the parietes of both vagina and rectum, guided and guarded by the finger in the latter canal. When all the sutures are inserted, the parts are to be cleansed, and the sutures tied. Then there are to be made incisions through the vaginal parietes, for the purpose of taking off the strain from the sutures, and these may be longitudinal, transverse, or semicircular, according as either is able to afford most relief. After the operation, the patient must be kept quiet, and the bowels constipated by diet or medicine, until the sutures are removed on the sixth day. Every day the vagina must be syringed with emollient fluids, and when the union is complete, the bowels may be freed by enemata.* M. Jobert gives three very interesting cases in which the operation was successful.

The great strain upon the sutures arises from the accumulation of fæces or air in the rectum, and it is very difficult to avoid this, inasmuch as a certain degree of constipation is necessary, in order to afford rest for the bowels.

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* Traité des Fistules, p. 340.

V. Laceration of the Perineum.—When this accident is of slight extent, it may not interfere with the comfort of the patient; but when extensive, it will generally be a cause of constant distress; and in either case the proper cure of the wound is important; as, if callosities form, or irregular cicatrices, much impediment may be offered in subsequent labours. At the same time it is only right to state, that even in very severe cases the distress is often mitigated. I have now seen three cases in which the perineum was torn, the sphincter divided, and also a portion of the anterior wall of the rectum; and yet somehow the patients were tolerably comfortable, and had to a certain extent control over the evacuations, unless these were too fluid. All the women were large, and the buttocks fat, which I think, assisted in the controlling the evacuations. It is an accident much more common with first labours than afterwards.

It will be recollected, that when the head of the child descends so as to fill the cavity of the pelvis, it necessarily makes pressure upon the lower part of the rectum and the sphincter ani; that it then receives a direction forwards and downwards, and successively distends the central space of the perineum and its anterior border. When the perineum offers much resistance, as with first children, the mucous membrane of the posterior wall of the vagina, owing to its laxity of connexion with the subjacent tissue, is partially everted, and forms a kind of artificial perineum. This is almost always torn, but the rent may extend no farther; and if we examine the day after delivery we shall find this mucous membrane retracted, and the true perineum untouched. This is not to be confounded with the laceration of the true perineum, of which we are about to treat.

The *situation and extent* of the rupture vary according to the cause and the circumstances of the case.

1. It may commence at the anterior border, and extend to the sphincter ani; and this is the most frequent extent.

2. The rent may involve the entire perineum, and extend through the sphincter ani, laying the cavities of the rectum and vagina into one.

3. The central space of the perineum is sometimes ruptured, leaving the anterior edge (the fourchette) and the sphincter ani untouched. Cases are related by Hernu, Coutouly, Lachapelle,* Meckel,† Lebrun,‡ Thiebaut,§ Frank, Martin,|| Moschner,¶

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* Duparcque: Ruptures ou Déchirures, &c., p. 368.

† Neue Jour. für. die Chir., vol. iv. 1811.

‡ Annales de Méd. Phys., July, 1825.

§ Journ. de la Soc. de Méd., vol. xxxiv. p. 178.

|| Arch. Gén. de Méd., vol. xxxiv.

¶ Bull. de Ferrusac.

Jungmann, Marter de Königsberg,* Trinchinetti,† Merriman,‡ Waller,§ Douglas,‖ Jobert,¶ Ellis,** and Thatcher.†† And a case occurred in this city. The rent may run along the central raphé of the perineum—on one side—diagonally—or in the form of the letter V or Y. In most of the above cases, the child actually passed through the central opening; but in some cases, by careful management, it was transmitted through the natural orifice, without rupture of the fourchette.

4. The recto-vaginal septum, sphincter ani, and part of the perineum may be torn, so as to permit the transit of the child, having the anterior portion of the perineum entire.

CAUSES.—The accident may arise from a deviation from the ordinary mechanism of parturition: from mal-conformation of the passage or soft parts; from mal-presentation; or from mismanagement.

1. If the *sacrum* be too *perpendicular*, the head of the child, instead of receiving a direction anteriorly, in the line of the axis of the lower outlet, will be forced downwards upon the posterior portion of the perineum.

2. If the *arch of the pubis be too acute*, so as to prevent the presenting portion filling its upper part, extraordinary dilatation of the orifice of the vagina will be necessary, and the head will be pressed with unusual force upon the anterior part of the perineum.

3. A similar effect is said to be caused by a *thickened state* of the *urethra* and circumjacent parts, in the arch of the pubis.

4. The *too rapid passage of the head* may be attended with this accident. This may depend upon the extraordinary violence of the pains, or upon the small size of the head, which prevents it receiving the successive changes of direction from the plane surfaces of the pelvis, and the changes in the axes of the cavity and lower outlet.

5. *Exostosis* in any part of the pelvic cavity may so act upon the direction in which the fœtal head is propelled, that rupture of the perineum may result.

6. *Excessive breadth of the perineum*, by receiving the force of the descending head in its centre, may be a cause of laceration,

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* Siebold's Journ., vol. xi. p. 276.

† Obs. sur l'Accouch. diff. Milan, 1819.

‡ Synopsis of Difficult Parturition, p. 263, 4th ed.

§ Waller's Note in Denman's Introduction, p. 36.

‖ Dublin Hospital Reports, vol. iii.

¶ Bull. de la Soc. Méd. d'Emulation, 1822.

** American Journ. of Med., Jan. 1849, p. 260.

†† Edin. Monthly Journ., Jan. 1851.

because the head rests in the centre, and distends it, instead of gliding forwards to the anterior edge.

7. *Rigidity* of the perineum, or an old cicatrix, may resist the dilating power of the head, and ultimately give way under the employment of greater force.

8. The tissue of the perineum may be *weakened* by disease, or by too much pressure, so as to offer little or no resistance.

9. *Occlusion* of the lower outlet by the *hymen*. As this membrane, though much thinner than the perineum, is far less distensible, if it do not give way, the perineum may. I attended a case in which the hymen resisted the pressure of the head (with strong pains) for two hours after the perineum was perfectly distensible, and in which there was every probability that the perineum would have been lacerated, had I not ruptured the hymen. Laceration of the hymen may also be extended into the perineum.

10. *Mal-position* of the child's head, by presenting a longer diameter than usual to the lower outlet, may give rise to this accident.

11. *Mal-presentations.*—Face presentation, involving the passage of the head in its longest diameter over the perineum; breech, or footling cases, which do not receive a proper direction so readily as the head, may also lacerate the perineum. Dupuis relates a case, where one foot came through the vagina, and one was forced through the perineum.

12. The accident may arise from the woman being *awkwardly placed* for delivery, or from her *starting away* from the attendant; or from her *exerting too much voluntary force* at the time the head passes through the lower outlet.

13. The perineum may be torn, in consequence of *want of care when instruments are used.* They ought generally to be removed just as the head passes through the vaginal orifice.

From this detail of the causes which may produce or predispose to laceration of the perineum, it will be seen that it may not always be in our power to prevent its occurrence.

SYMPTOMS.—If the laceration be very slight, no ill consequences will ensue; but if it extend to the sphincter, the patient will feel a want of support at the lower outlet, and a sense of "falling through." It is said to influence subsequent cohabitation, and certainly it will favour procidentia of the uterus. If the recto-vaginal septum be torn, the condition of the patient will be very pitiable. The fæces (for some time at least) pass through the vagina involuntarily, and the utmost attention to cleanliness will not suffice to prevent the offensive smell which renders the patient an object of disgust to herself and her friends. The lochial discharge passing over the wound, will for a time prevent any natural efforts at cure; and the edges may become callous, or degenerate into ulceration. When slight, the rent generally contracts, and is healed without our interference, after a short time; and even when the recto-vaginal septum is torn, partial union may take place, leaving only a fistulous opening, or a kind of valve may be formed, so that under ordinary circumstances, the patient is partially relieved of her infirmity. But this is the work of time; it may be months or years.

Treatment.—1. *Preventive management.*—A few words may not be misapplied in pointing out the best mode of preventing this occurrence.

1. Defects in the passage, which render the mechanism of expulsion inefficient, may often be remedied by the application of the hand in such a manner as to give a direction forward to the head.

2. Direct support should be given to the perineum when distended; but this is frequently carried to excess, and produces the accident it is intended to prevent; it should be moderate and gentle—just so much as to support the parts, but no more. I must altogether object to any attempt to retard the passage of the child, as erroneous in theory and mischievous in practice.

3. When the perineum is rigid and undilatable, benefit may be derived from fomentations with hot water, the use of warm oil, lard, or pomatum.

4. Under no circumstances is it justifiable to dilate the external orifice with the hand, as formerly recommended; on the contrary, instead of drawing back the perineum, it ought to be carried forward.

5. If laceration be threatened in consequence of the persistence of the hymen, it may be incised with a blunt-pointed bistoury.

6. The patient should always cease forcing, and remain perfectly quiet during the exit of the child.

2. *Curative treatment.*—Slight cases, as I have said, will often heal without assistance. Even when the rent is more extensive, a cure may be effected without further interference than great cleanliness, keeping the patient in one position, so as to preserve the edges of the wound in contact, and constipating the bowels after free purgation. If this do not succeed, we are advised to use a degree of compression, passing a binder round the hips, and a pad on either side of the perineum, so as to secure the apposition of the lips of the laceration. Strips of adhesive plaster have been

applied, but they do not answer. In many cases either of these plans have succeeded, but in many cases also they have both failed, especially when the recto-vaginal septum is involved. However, we have still another resource.

In *the suture*, which was first proposed by Ambrose Paré, and practised by Guillemeau, La Motte, Saucerotte, Trainel, Noel, Dieffenbach, Roux, Baker Brown, &c. The operation should either be performed immediately after delivery, or be postponed until all irritation has subsided, and the lochia have ceased. After this period, the sutures may be used, nor need any lapse of time render us hopeless of the cure.

Three different kinds of suture have been adopted—the *interrupted*, the *twisted*, and the *quilled* suture. Osiander, Dieffenbach, &c., succeeded with the *first*, but according to Duparcque, the success and failure have been nearly equal. Mr. Alcock cured one,[*] and Mr. Rayer two patients in this way. Dr. Mettauer,[†] of Virginia (U.S.), succeeded with lead sutures; they were introduced, and the parts approximated by twisting the ends together. They were removed in six weeks, and union found to have taken place. The great objection to the interrupted suture is, that the lips of the wound are not closely applied in the whole extent, and the union is often partial.

The same observation may be applied to the *twisted suture*, although it has succeeded with Morlanne, Saucerotte, Noel,[‡] Dieffenbach,[§] &c. M. Langenbeck's method of operating consisted—1, in separating for some little distance the anterior wall of the rectum from the posterior wall of the vagina; 2, after removing the surface of the laceration, in applying sutures, beginning at the rectum; 3, in including the angles of the torn vagina in the last suture, at the fourchette, by which means the canal of the vagina is completed, and the discharge carried off; 4, in tightening the sutures after all have been inserted; 5, in taking off the strain upon them, by making an incision through the skin on each side of them.[||]

The *quilled suture* is evidently better adapted for the purpose, as the entire surfaces of the laceration may be brought into contact. Dupuytren succeeded once, Roux and Dieffenbach several times, M. Dubois failed, but Mr. Davidson succeeded completely. He thus relates the case:[¶] "On the 6th of November, 1838, in company with Dr. Henry Davis, I performed the operation in the following manner. I passed deeply a strong double ligature, by means of a common curved needle, close by the edge of the rectum, and another, rather more than half an inch from the first, towards the vagina; after which I pared the edges of the wound, which I had not previously done, that I might not be annoyed by the oozing of blood, so as to be enabled to place the ligatures more accurately. The ligatures being introduced, I employed as cylinders two pieces of elastic gum catheter, about an inch and a half in length, one of which was placed in the loops which the double ligature formed on one side, and the other between their separate ends, tying them firmly upon the cylinder. Baron Roux found, in his cases, that the use of the quilled suture caused an eversion of the edges of the wound: to remedy this, he had recourse to several small sutures at different points between the different ligatures. To effect the same object, and also with a view of keeping the divided parts more closely and firmly in contact, I adopted the following plan, the materials for which I had prepared previously to the operation: I armed a curved needle with a piece of narrow tape, four inches long, having a knot at one end; this was passed down each end of both cylinders about half an inch, and brought outwards, the end of the tape being prevented slipping through by the knot; the tapes were then placed in such a situation as to be intermediate to the ligatures; this being done, I turned the cylinders gently towards the edge of the wound, and tied the corresponding tapes over it, which, I think, rendered it much more solid than any number of small ligatures could have done." The bowels were constipated by opium, the urine drawn off night and morning, and the diet consisted of small quantities of gruel and hard biscuit. The ligatures were removed on the seventh day, and union was found to have taken place throughout. The urine was evacuated naturally after nine or ten days, the bowels relieved on the seventeenth, and after six or seven weeks she was able to go about as usual. If there should be loss of substance, or contraction of the two sides of the perineum, so that they will not readily meet or remain in contact, Dieffenbach makes an incision through the skin on each side. Dr. Horner has suggested that the sphincter ani should be divided on each side, in order to allow the parts to remain in contact. In one case he also constructed a flap for the upper and lower half, from opposite sides, so as to supply the loss of substance.* His plan of dividing the sphincter has been also recommended by Messrs. Copeland,

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[*] Merriman's Synopsis, p. 110.

[†] Edin. Med. and Surg. Journ., vol. xix. p. 552.

[‡] Capuron: Mal. des Femmes, p. 489.

[§] Lancet, March 3, 1838.

[||] Gazette des Hôpitaux, Jan. 22 1853, p. 38.

[¶] Lancet, May 4, 1839.

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* American Journal of Med. Science, Oct. 1850, p. 329.

Bransby Cooper, and Baker Brown.* The latter gentleman, who has published several successful cases, also advises constipation for some time after the operation. He first pares the edges of the laceration, then inserts the sutures deeply, and afterwards divides the sphincter ani on each side, whilst the patient is under the influence of chloroform. The bowels should be freed well before the operation, and an opiate given, so as to constipate them; when union is attained, this may be remedied by an enema. The catheter must be passed morning and evening for some time. In cases where the sphincter is torn through, and perhaps a portion of the rectum, I would advise a division of the operation: first, the union of the edges of the rectum, and then the perineum. The diet should be spare: a little gruel and biscuit will answer very well. Of course absolute rest is necessary. "If the radical cure fail," Dr. Burns observes, "the patient must use a compress, with a spring bandage, if the stools cannot be retained. But it sometimes happens that the torn extremity of the rectum, or the anterior parts, containing a fragment of the sphincter or a portion of the internal sphincter, as it has been called, forms a kind of flat valve, which rests on the posterior surface at the coccyx, so that the orifice now resembles a slit, and the fæces, unless very liquid, remain in the hollow of the sacrum, and do not pass through the vulvular orifice till an effort be made to expel. Sometimes the perineum unites, but the septum does not, and the inner surface of the rectum protrudes into the vagina. In these cases the edges of the septum must be made raw, and stitches used."

CHAPTER XXII.

PARTURITION.—CLASS III. COMPLEX LABOUR.

ORDER 6. INVERSION OF THE UTERUS.

This is a very rare complication, but a very distressing and dangerous one. It is neither more nor less than a turning of the uterus inside out. The fundus descends through the os uteri, forming a cavity lined by the peritoneum, open towards the abdomen, and containing the ovaries and fallopian tubes, whilst that which was formerly the lining membrane of the uterine cavity, has become the external covering of the tumour.

The degree of inversion may vary: it may be *partial* or *com-*

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* On the Surgical Diseases of Women, p. 31. 1852.

plete. Mr. Newnham, who has published a valuable monograph on this subject, has spoken of three degrees—*depression, partial,* and *complete* inversion. With regard to the first, he observes, "The fundus of the uterus is depressed within its cavity, but does not form a tumour in the vagina. The actual existence of this stage of the disease can only be known by introducing the finger into the uterus, and by ascertaining the state of that organ by pressure upon the abdomen. By the *former process,* the fundus of the womb will be found to have approached the os internum, and by the latter a corresponding depression will be observed, instead of that regular contraction which is so familiar to every prudent practitioner. This state is generally accompanied with an effort to bear down, by which it is often converted into *partial* or *even complete* inversion." Of course, so slight a change in the uterus is only perceptible through the parietes of the abdomen when the patient has been recently delivered. In the unimpregnated uterus, such an examination would yield no information. "When the inversion is *partial,*" continues Mr. Newnham, "the fundus of the uterus is brought down into the vagina, forming a tumour of considerable size, presenting a semi-spherical form, and closely invested by the os uteri. In this case the depression of the fundus, observed through the parietes of the abdomen, will be considerably greater than in the former, "and the edge of the cavity thus formed will alone be felt. In the *complete* inversion, the uterus will be found not only filling the vagina, but protruding beyond it, resembling in its form that of the uterus after recent delivery, only that its mouth is turned towards the abdomen. The os uteri may be felt at the superior extremity of the tumour, forming a kind of circular thickening at its apex, and the uterus is wholly wanting in the hypogastric region. This state is usually accompanied with inversion of the vagina."*

Inversion may occur under very different circumstances; as for example: 1. *Immediately after delivery,* as the result of a peculiar condition of the uterine fibres, of too quick delivery,† &c. Dr. Skae has recorded one which occurred after an abortion at four months, and which was reduced twelve hours afterwards.‡ 2. *A few days after parturition,* though Newnham conceives that in these cases *depression* of the fundus existed from the first. 3. Or *very gradually,* in consequence of a polypus attached to the fundus, the uterus not being pregnant. Astruc, Capuron, and

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* An Essay on the Symptoms, Causes, and Treatment of Inversio Uteri, p. 2.

† Williams: Lancet, July 27, 1839.

‡ Edin. Monthly Journal, May, 1849, p. 774.

Newnham doubt the existence of such cases; but several are on record,[*] and I witnessed one myself, of the nature of which no doubt could be entertained.[†] We may be deceived, however, and suppose an inversion to have occurred gradually, because it has remained long undiscovered. Levret mentions a case occurring after delivery, which was not detected for five years.

By almost all authors, inversion has been divided into *acute* and *chronic;* not, however, confining the term chronic to cases where the production of the inversion has been slow, but including all those where it has existed for some time. The division appears to me to be useful and practical, though perhaps not conveying as much information as the terms "*reducible*" and "*irreducible,*" which Dr. Radford, of Manchester, has proposed as the substitute.

CAUSES.—Various causes are enumerated by authors, some of which are real, and some only fanciful. Most of them, however, are such as would act merely mechanically. It has been observed to follow very quick labours, especially if the patient be delivered standing, or if she make too violent efforts. It may occur spontaneously,[‡] after the labour has been completed quite naturally, and in these cases it has been attributed by Dr. Radford to atony of the uterus, or to active contraction of one part, with an atonic condition of another. Dr. Tyler Smith regards inversion as depending upon an irregularly active condition of the uterus, by which the fundus is first depressed, then carried downward by the annular contraction of the uterus, and finally, *completely* everted. Nauche considers the inactive state of the uterus, and some effort made by the patient, or by an attendant pulling the cord, as the principal causes.[§] Capuron enumerates, as *predisposing* causes, the development of the womb, the dilatation of its orifice, and the atony or flaccidity of its walls. The *exciting* causes may be the weight of the fundus, violent expulsive efforts, tractions by the funis, and the dragging downwards by a polypus.[‖] Henckel attributes this accident to violent after-pains; Meissner to a bodily predisposition, owing to a laxity of fibre. Siebold says that atony of the uterus, with a large pelvis and the too rapid abstraction of the contents of the uterus, may expose the patient to inversion.[¶] Boivin and Dugès enumerate, among the principal causes of inversion, a flaccid, distensible state of the uterine parietes: inertia of the uterus, especially if, at the same time, an effort be made for the extraction of the placenta; irregular uterine contraction, too prominent sacral promontory, dragging at the cord, and uterine polypus.[*]

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[*] Jourdan: Dict. de Méd., vol. xxiii. p. 289.

[†] Dublin Journal of Med. Sciences, Sept., Nov. 1837.

[‡] Waller's Ed. of Denman, p. 244, note.

[§] Mal. prop. aux Femmes, vol. i. p. 131.

[‖] Mal. des Femmes, p. 495.

[¶] Handbuch der Frauenzimmerkrankheiten, vol. iii. p. 365.

It is very credible that violence in extracting the placenta may be followed by inversion;[†] or, as Denman observes, "there is reason to believe that the uterus has been inverted, when, on account of a hæmorrhage, or some other urgent symptom, the hand has been introduced within the cavity of the uterus while in a collapsed or wholly uncontracted state, and the placenta being withdrawn before it was perfectly loosened, the fundus of the uterus has unexpectedly followed, and a complete inversion has been occasioned."[‡] Forcibly pulling the funis, for the purpose of detaching the placenta, may, perhaps, under certain circumstances, give rise to this accident, but it is not a frequent cause. Shortness of the funis, or the shortening of it by coiling around the neck of the fœtus, has also been alleged, but I believe without any foundation. Cords of ten inches long will permit, and have permitted, the exit of the fœtus without displacing the womb, and it is very rare indeed to find the funis so short. As to the shortening of the cord when it is twisted around the neck, this can never be the cause of inversion, since it rarely occurs but when the cord is longer than usual, and it very seldom reduces the length of the cord below twelve inches.

But inversion may occur quite unconnected with parturition, as I have already stated. If a tumour form at the upper part of the fundus uteri, it will first distend the uterus mechanically, and then, by its weight, it may descend through the os uteri, dragging the fundus after it, and so produce complete inversion. Such a case I saw in Jervis-street Hospital, under the care of the late Surgeon Lynch. Cases of this kind are also related by Dr. Browne,[§] M. Leblanc,[||] Dr. Oldham, and one, more recently, by Dr. Higgins, who successfully removed both the uterus and the tumour with the knife, having previously tied a tape around the upper portion as a precaution against hæmorrhage. The patient bore the operation well, and recovered perfectly.[¶]

SYMPTOMS.—We shall first examine the symptoms which arise in *acute* inversion—*i.e.*, when it occurs soon after delivery, and when the displacement is nearly or quite *complete*. These are always serious and alarming, indicating the important nature of the accident. The most universal symptom is a sudden exhaustion or sinking, which comes on immediately after the inversion. It does not depend upon flooding, for it occurs in many cases where there is no hæmorrhage. The countenance becomes deadly pale, the voice weak, the pulse rapid, small, and fluttering, nausea and vomitings occur, &c., so that the patient is suddenly threatened with the extinction of life.* Several authors speak of more decidedly nervous symptoms, and even of convulsions,† but by some, at least, the restlessness and agitation preceding dissolution, appear to have been mistaken for convulsions. When the inversion is slighter in degree, these phenomena will generally be found less strikingly marked. Hæmorrhage, even to a very large amount, not unfrequently occurs, aggravating, though not changing, the symptoms already enumerated, and materially enhancing the danger of the patient. Mr. Newnham observes, "When the uterus has become inverted, immediate hæmorrhage takes place, which is quickly followed by faintness and a sense of fulness in the vagina, and, in the greater number of instances, almost by immediate dissolution."‡

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[*] Diseases of the Uterus, p. 117.

[†] Manning on Female Diseases, p. 285.

[‡] Midwifery, p. 421.

[§] Dublin Med. Journal, vol. vi. p. 33.

[||] Mém. de l'Acad. de Chir., vol. iii. p. 379.

[¶] Ed. Monthly Journal, July, 1849, p. 889.

Our suspicions of inversion will be excited when this persists longer than usual, and an examination should instantly be made to ascertain the cause, if possible. In many cases, however, there is no hæmorrhage at all, or not in proportion to the inversion, but merely the nervous symptoms and exhaustion; nor does the difficulty of rallying the patient seem to be less in these cases than in those accompanied by flooding.

There is generally a very violent uterine contraction immediately preceding or accompanying the inversion, leading the patient to anticipate a second child; this supposition is further confirmed by the pressure of the inverted uterus as it passes through the pelvis. Even on examination *per vaginam* we may be deceived, by mistaking the uterus for the breech of a second child. The patient complains of great pain, with a sense of dragging from the loins, and occasional retention of urine. If pressure be made on the abdomen, we shall not be able to feel the contracted uterus, and this being at a time when it is large, constitutes a marked and valuable symptom.§ When the inversion is incomplete, we may sometimes feel the uterus above the brim of the pelvis, but having a cup-like depression superiorly.

If we examine *per vaginam*, we shall find a tumour either in the cavity of the pelvis or hanging through the vulva. This tumour is globular, sensible, elastic, with a rough and bleeding surface, wider below than above, where it is tightly encircled by the cervix uteri. If the displacement be not reducible, it sometimes happens that the tumour is attacked by inflammation, running on into sloughing and gangrene, owing to the strangulation caused by the contraction of the cervix, and ending in the death of the patient. If the placenta have not been previously expelled, it will be found adherent to some part of the tumour, adding greatly to its bulk. A considerable difference in the size of the tumour will be observed according as the inversion is *complete* or *incomplete*, recent or of old standing. If quite *complete*, we may acquire further information from a visual examination. The tumour is of a red colour when the inversion is recent, but gradually becomes of a dull brown.* If *incomplete*, we shall still be able to detect it in the vagina, though, if there be *depression* merely, we may not be able to reach it.

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* Duncan's Annals of Med., 1800, p. 390.

† Burns' Midwifery, p. 518.

‡ Essay on Inversion, p. 86.

§ Denman's Midwifery, p. 420.

The foregoing are the most prominent symptoms of *acute* inversion; those which characterize the *chronic* stage of the disease, whether that stage be the issue of an *acute* attack or the result of a gradual displacement, are, of course, much less formidable. The patient is subject to occasional irregular hæmorrhages, and to a constant and profuse mucous discharge during the intervals.† Every month the surface is observed to be covered with red drops, which are, in fact, the menses.‡ The patient complains of pain, a sensation of weight in the pelvis, and dragging from the loins. If the uterus protrude through the external parts, its sensibility will gradually diminish, in consequence of the formation of a kind of epithelium upon its surface; and if it be exposed to rude contact, or if acrid secretions be allowed to accumulate upon it, circumscribed inflammation may occur, followed by ulcerations, either superficial or profound, and involving some danger to the patient, if not remedied.

The constitution of the patient sympathizes deeply with so extraordinary an accident. After recovery from the state of exhaustion or nervous depression into which she was at first thrown, the repeated hæmorrhages and constant leucorrhœa will render her countenance pale and exsanguine, and subject her to various secondary symptoms, such as syncope, dropsical effusions, hectic, &c.

TERMINATIONS.—The patient may die from exhaustion or from hæmorrhage soon after the accident, according to Heister,[*] Peu,[†] Levret, Giffard, Windsor, Clarke, Denman,[‡] Boivin and Dugès; or from the more distant consequences of the repeated hæmorrhages, as related by Mauriceau,[§] Haighton, Cooper, Windsor. Fatal cases are also related by Peu, Portal,[‖] Vanderweid, and Millot, Chapman,[¶] Saviard,[**] Heister,[††] Smellie,[‡‡] and Mauriceau. Boivin and Dugès add, that "death following a very few days after the inversion, may have been occasioned by pains, convulsions, and syncope, caused even by the violence which the uterus has undergone."

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* Boivin and Dugès: Dis. of Uterus, &c., p. 114.

† Gardien: Traité des Acc., vol. iii. p. 325.

‡ Clarke: Dis. of Females, vol. i. p. 154.

Distension and inflammation of the bladder may occur, involving considerable danger.[§§] The inverted uterus may be strangulated, and be separated by sloughing or gangrene, with great danger, although cases are on record where this termination issued favourably.[‖‖] Or, if the patient do not sink from the primary shock, and if no destructive process take place in the tumour, it will, after a while, shrink very much in size, and the patient may suffer comparatively very little annoyance. Denman mentions the case of a patient who consulted him for an inverted uterus twenty years before her death; and Lamotte another, "in which the inversion was complete thirty years before." Very rarely the detruded organ has become the seat of malignant disorganization, either cancer or corroding ulcer.

DIAGNOSIS.—The facility of the diagnosis will depend very much upon the extent of the inversion; when incomplete, it is very difficult, and even when complete it will often require great care. It is less obscure if the examination be made soon after the accident.

1. If *incomplete*, it may be mistaken for *polypus uteri*, but it will be distinguished by its bleeding and rough surface, by its insensibility, and by the "*cul de sac*" within the os uteri. In a case published by Dr. M'Clintock,[¶¶] the diagnosis was by no means so easy. The tumour was not large, nor peculiarly sensible, nor had it a rough surface: moreover, there was something like a neck to it, and a well-marked os uteri surrounding it. The finger alone could not have distinguished it from polypus, but at no part could a bougie be passed into the uterine cavity, and when the tumour was drawn down, all appearance of cervix and os uteri was obliterated.

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[*] Surgery, vol. ii. p. 559.
[†] Prat. des. Accouch., p. 585.
[‡] Midwifery, p. 422.
[§] Traité des Accouch., vol. ii. p. 294.
[‖] Obs., 76.
[¶] Midwifery, Case 29.
[**] Obs., 15, 36.
[††] Obs., Case 369.
[‡‡] Midwifery, Case 3, p. 444.
[§§] Burns' Midwifery, p. 519.
[‖‖] Ryan's Journal, March 12, 1836.
[¶¶] Dublin Quarterly Journal, Feb. 1859.

2. If *complete*, it will resemble *prolapse of the uterus*, but may be distinguished by the period of its occurrence, by the flooding, by the absence of the smooth vaginal covering of the bladder anteriorly, and of the os uteri inferiorly.

3. It may be distinguished from *prolapse of the vagina* by its hardness, its rough, flocculent, and bleeding surface, and by its unvarying size.

The value of some of these characteristics, such as the hæmorrhage, the state of the cervix, and the size of the tumour, is limited to a short period after the accident, and to those cases which occur after delivery.

Treatment.—1. Of *acute* inversion. Our first object is unquestionably to reduce the displaced organ; and if we are on the spot when the accident occurs, it is in general not very difficult. It is of the last importance that the reduction be attempted instantly. Every hour increases the difficulty, and the lapse of four or five, according to Denman[*] may render it impossible. The period when the inversion becomes irreducible will be found to vary widely in different cases, and according to the experience of different practitioners. There is also a great difference, according as the inversion is complete or incomplete. It has been stated to have been reduced spontaneously, when the fundus uteri was merely depressed,[†] and even when the displacement was complete.

But no anticipation of such an occurence will justify our losing a moment in attempting to re-invert the uterus. The protruded organ should be grasped firmly and passed in through the vaginal orifice, followed by the hand (previously well oiled), which, when in the vagina, should be closed and formed into a cone, and made to press mainly upon the fundus uteri. No effect will be produced upon the inversion until the vagina shall have been put upon the stretch; but then, after some time, it will be found to recede, and on being still further pressed, it suddenly starts from the hand (like a bottle of india-rubber when turned inside out), and the organ is restored to its natural condition. The hand now in the cavity of the uterus is not to be withdrawn, but rather allowed to be expelled by the uterine contraction. This will insure the patient against a repetition of the accident. We should also assure ourselves, before the removal of the hand, that the restoration has been complete. I need not say that (unless counter-indicated) the operation will be more easily performed under chloroform. Mr. Newnham advises that we should endeavour to

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[*] Midwifery, p. 420.

[†] Capuron: Mal. des Femmes, pp. 504, 509.

"return first that portion of the uterus which was last expelled from the os uteri." It will be found very difficult to attend to this minutely, when the hand with the uterus is in the cavity of the pelvis, for want of room; and whilst the tumour is external, the re-inversion does not take place. It is expressly stated by several authorities, that they did not feel the reduction properly commence until the vagina was stretched to its full extent.

In many cases the placenta remains attached to the womb at the period of inversion, and different opinions have been held as to the propriety of removing it before reducing the displacement. Baudelocque, Gardien, Capuron, Boivin and Dugès, Radford, and others, recommend its prior removal; but Denman, Clarke, Burns, Carus, Newnham, Blundell, Gooch, &c., as decidedly oppose it. Mr. Newnham remarks, "It has been recommended by several respectable authorities to remove first the placenta, in order to diminish the bulk of the inverted fundus, and thus facilitate the reduction. But it is surely impossible that this proceeding can be attended with any beneficial consequences, whilst the irritation of the uterus would necessarily tend to bring on those bearing-down efforts which would present a material obstacle to its reduction, and would increase the hæmorrhage at a period when every ounce of blood is of infinite importance." "Besides, returning the placenta while it remains attached to the uterus, and its subsequent *judicious* treatment as a simply retained placenta, will have a good effect in bringing on that regular and natural uterine contraction which is the hope of the practitioner and the safety of the patient." It may be doubted, I think, whether the removal of the placenta is attended with so much danger; for in many instances it has been found impossible to reduce the uterus in consequence of the great addition to its bulk which the adhesion of the placenta occasions; and in such cases there is no hesitation about the propriety of removing the placenta, nor have I met with any evil effects recorded as the result of so doing. I have no doubt, therefore, that as removing the placenta would facilitate the reduction of the inversion by lessening its volume, that the proper method in general would be to peel it off before attempting to restore the organ.

When the tumour is in danger of strangulation from the circular band of the fibres of the cervix uteri, or in case such band should seriously impede the reduction, it has been recommended to divide it with a bistoury. Of course the bladder and rectum should be emptied previous to returning the uterus, unless we are present at the moment the accident occurs; at that time, the operation occupies so short a time that catheterism may be deferred until afterwards, and constipation for twenty-four hours will rather be an advantage. If the inverted uterus and the neighbouring parts should be much swollen, or if the patient be feverish, it may be necessary to take away some blood and foment the parts before attempting the reduction.

But should the disease be of some days' standing, are we to look upon the reduction as hopeless? Certainly not. There are cases on record of the attempt having been successful after days and weeks have elapsed, and the condition of the patient is so distressing that no means, however apparently unlikely, should be left untried. In Lofler's case, 6 or 7 hours had elapsed; 17 in Mr. White's case; 24 in Mr. Winter's; 28 in Mr. Dickenson's; 3 days in Mr. Cawley's; 7 in Dr. Radford's (case 6); 8 in MM. Chopart's and Anè's; 8 in Mr. Ingleby's; 10 or 12 in M. Lauverjat's; 13 in M. Hoin's; and 12 weeks in Dr. Belcombe's. More recently Mr. Canney* reduced one of 5 months' standing; and M. Barrier† one of 15 months, both under chloroform; and I have no doubt that this agent will be found of great value in facilitating the operation. Plenck advises dilatation of the os uteri before attempting the reduction, and perhaps in some cases this may be possible.

If we succeed in restoring the womb to its natural state and situation, great care will be requisite to avoid a recurrence of the accident, or, what is more likely, a prolapse of the uterus. The patient should remain longer than usual in the horizontal position, with the head low, the pelvis elevated, and the knees bent. A dose of opium will be found very useful, and, if there be much exhaustion, it must be repeated, and stimulants in proper quantity be given. A pessary has been advised, in order to maintain the uterus in its place, but this will very rarely be necessary. When the lochial discharge has entirely ceased, it may be beneficial to use some astringent injections into the vagina once or twice a day, especially if leucorrhœa be present.

If the inversion be *irreducible*, we must then consider how far it may be advisable to content ourselves with palliative remedies, such as returning the tumour into the vagina to protect it from injury, and supporting it either by a bandage and compress, as recommended by Dr. Hamilton for prolapsus uteri, or by a pessary.

Should this plan not be practicable, or fail of success, it may then be a question as to the propriety of extirpation. There is abundant evidence to prove that life may be preserved after the loss of the womb. Rousset relates a case where the uterus was destroyed by gangrene, and the patient recovered; and Rousset, Primrose, Radford, and Cooke, have given cases in which the uterus appears to have sloughed off, without compromising the patient's life. This being the case, there is every encouragement, within certain limits, to effect that removal by art which nature thus so beneficially accomplished. In this opinion Sir C. Clarke fully coincides: he observes, "In those cases of inversion of the uterus where the woman has *passed the menstruating age*, when her comfort is destroyed by the disease, and when the profuseness of the discharge threatens her with death, from the debility which it produces, it may be advisable to recommend the performance of an operation which has been attended with success, viz., the removal of the inverted uterus itself." "How far it may be right to resort to this operation *during the menstruating part* of a woman's life, the author has no means of judging."* The operation, however, has been performed during the "menstruating part of a woman's life," with complete success. We may therefore conclude that the operation is perfectly justifiable, provided 1st, that the patient is in a fit state of health for an operation; and 2ndly, that the uterus be not affected with scirrhus or cancer.

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* Med. Times and Gazette, Sept. 18, 1852, p. 286.

† Ibid., Sept. 4, 1852, p. 231, from Archives Gén., Mai, 1852.

The operation has been successfully performed by Ambrose Paré, Petit, Carpi, Sclevogt, Vater, Laumonier, Bouchet, Boudol, Dessault, Hunter of Dumbarton, Chevalier, Johnson, Hamilton, Clarke of Dublin, Newnham, Windsor,† Davis, Hull, Blundell,‡ Moss,§ Lasserre,‖ Williams,¶ Higgins,** Geddings, Teale, M'Clintock, &c. Other cases less fortunate are on record.

The operation consists in applying a ligature of silk, whipcord, fishing-line, or silver wire, around the tumour at its highest part, and gradually tightening it, as the patient may be able to bear it, until the tumour is entirely separated. Or a double ligature may be passed through the centre of the neck of the tumour, and each half included in a separate ligature. Or, as was successfully done by Dr. Geddings†† and Mr. Teale,‡‡ we may prefer, after tightening the ligature to a certain degree, to remove the tumour immediately by cutting below the ligature, or what is simpler,

* Diseases of Females, vol. i. p. 149.

† Med.-Chir. Trans., vol. x. p. 358.

‡ Diseases of Women, p. 144.

§ Brit. and Foreign Med. Rev., April, 1837, p. 561.

‖ Encyclograph. des Sciences Méd., vol. xxxvi. p. 179.

¶ Lancet, July 27, 1839. ** Ed. Monthly Journal, July, 1849.

†† Charleston Med. Journal. Ranking, vol. xx. p. 201.

‡‡ Med. Times and Gazette, Sept. 1, 1855.

and I think safer, the tumour being drawn down may be removed by the *écraseur*, as was done by Dr. M'Clintock. We must take care to include only the uterus and not to wound the perineum. Before doing this, it will be necessary to satisfy ourselves of the adequacy of the ligature to restrain any hæmorrhage.

The symptoms which arise after the application of the ligature are just such as we might expect from the strangulation of so important a viscus. The patient suffers from nausea, vomiting, and pain, which greatly diminish in the more favourable cases, but which are the prelude to peritonitis in the fatal ones. When these symptoms are violent, it will be necessary to loosen the ligature, and wait some hours before again tightening it. A full dose of opium should also be given, and the bowels kept free by enemata. The strength of the patient should be maintained by a nutritious, though not stimulating diet.

If the inversion be caused by or complicated with polypus, it may be necessary to remove both, and the polypus should be excised before applying the ligature to the uterus.

CHAPTER XXIII.

PARTURITION. CLASS III. COMPLEX LABOUR.

ORDER 7. CONVULSIONS.

THE next complication I shall notice is that affection of the nervous system termed convulsions—*i.e.*, a convulsive seizure of the entire body and extremities, omitting those partial attacks which we see occasionally, although they be of a convulsive or spasmodic nature. The complication is a very frightful and a very dangerous one, and may occur either *during gestation, immediately before, during*, or *after parturition.*

The variety of opinions and methods of treatment which have been put forth, seems mainly to have arisen from confounding the different species of convulsion: and in order to avoid this, I shall describe three varieties—the *hysteric*, the *epileptic*, and the *apoplectic* convulsion.

I. HYSTERIC CONVULSIONS.—This variety is confined to the period of gestation, and is more frequent during the early months than subsequently. Females of a nervous or hysterical constitution are the most obnoxious to the attacks.

CAUSES.—Want of sleep, or excessive fatigue, may give rise to hysteric convulsions, or they may be caused by disordered digestion.

SYMPTOMS.—The attack is generally preceded by a tightness about the throat, by sobbing, or repeated attempts at swallowing. The patient then becomes still and motionless, or may roll about from side to side. The hands are frequently pressed upon the breast, or carried to the neck, as though to remove some obstruction. The face is generally, though not always, pale, and not distorted; no froth issues from the mouth, nor are there the convulsive motions of the lower jaw, by which in epilepsy the tongue is sometimes severely bitten. In many cases the muscles of the back are violently contracted, which Dr. Dewees thinks a pathognomonic symptom. The patient is not insensible, though she cannot express her feelings or wishes. After this state has continued for a longer or shorter time, the sobbing becomes more violent, or the patient screams and sheds tears, and the fit thus terminates. A great quantity of limpid urine is also discharged.

The paroxysm may be a single occurrence, or return after a time, with the same phenomena, and assume a more exaggerated form.

It does not generally influence the progress of gestation, though I have seen premature labour take place during the paroxysm. The mother's health may be rendered rather more delicate, but it is not seriously compromised by the disorder.

DIAGNOSIS. 1. *From epileptic convulsions.*—The body is but slightly contorted; there is no complete insensibility; there is no frothing at the mouth, nor biting the tongue, nor stertorous breathing; and after the fit is over, the patient recovers her usual state—the reverse of all which symptoms occurs in epileptic convulsions.

2. *From apoplectic convulsions.*—In these the patient loses consciousness and voluntary motion at first, and ultimately all motion ceases; this is not the case in hysteric convulsions; besides which, in the latter the breathing is not stertorous, and the patient soon recovers.

TREATMENT.—If the pulse be quick (which is not ordinarily the case), or the head ache, venesection may be practised, or a few leeches be applied to the forehead; but this is rarely necessary. In most cases, antispasmodics, combined with diffusible stimuli (valerian or assafœtida, with ammonia), will relieve the patient. Volatile alkali, held to the nostrils, is useful; or cold water dashed upon the face, and in severe cases, when the attacks are repeated, a blister may be applied to the back of the neck.

When the paroxysm is over, a moderate dose of opium may be given; and, after a sound sleep, the patient will find herself nearly restored. The stomach must be attended to. Tonics may be given if necessary, and aperient medicine.

II. Epileptic Convulsions.—This variety is by far more frequent than either of the others.

Statistics.—*Frequency.*

Authors.	Total Number of Cases.	Convulsions.
Dr. Bland	1,897	2
Dr. Jos. Clarke	10,387	19
Dr. Merriman	2,947	5
Dr. Granville	640	1
Dr. Cusack	398	6
Dr. Maunsell	848	4
Dr. Collins	16,654	30
Dr. Beatty	399	1
Dr. Ashwell	1,266	3
Dr. Mantell	2,510	6
Dr. Churchill	600	2
Drs. Hardy and M'Clintock	6,634	13
Dr. F. H. Ramsbotham	68,435	67
Mr. Earle	4,320	8
Mr. Rose	600	2
Mr. Bailey	2,819	11
Dr. Toogood	1,135	1
Dr. J. Lee	850	2
Mr. K. Watson	800	4
Dr. Copeland	1,290	3
Mr. J. Thompson	3,300	6
Drs. Johnston and Sinclair	13,748	63
Dr. Hall Davis	7,302	5
Mr. Harrisson	1,000	2
Mr. Swift	5,026	18
Mr. Lawrence	1,000	3
Dr. Arneth	6,527	13
Mad. Boivin	20,357	19
Mad. Lachapelle	38,000	61

Thus we have 373 cases of convulsion in 228,010 cases of labour or 1 in about 614.

Authors.	Cases of Convulsions.	Mothers lost.
Mr. Giffard	4	2
Dr. Smellie	8	2
Mr. Perfect	14	5
Dr. Bland	2	0
Dr. Jos. Clarke	19	6
Dr. Newman	36	8
Dr. Ramsbotham	26	10
Dr. Maunsell	4	2
Dr. Collins	30	5
Dr. Beatty	1	0
Dr. Churchill	2	0
Dr. Mantell	6	2
Drs. Hardy and M'Clintock	13	3
Dr. F. H. Ramsbotham	43	3
Dr. Arneth	13	4
Dr. Meigs	20	3
Dr. Huston	13	2
Mr. J. Thompson	6	0
Drs. Johnston and Sinclair	63	13
Dr. Hall Davis	8	1
Mr. Harrisson	2	1
Mr. Swift	18	3
Dr. Lawrence	3	0

Thus, out of 354 cases, 75 mothers were lost, or about 1 in 4½.

Women of all temperaments may be attacked, but it is more common, as Dr. Collins has remarked, "in strong plethoric young women with their first children; more especially in such as are of a coarse make, with short thick necks."* Dr. Ramsbotham has stated that "women with large families are equally or perhaps more liable to be assailed." This, however, is not borne out by numerical investigation, for of thirty-six cases related by Dr. Merriman, twenty-eight were with first children. Of Dr. Ramsbotham's own cases, more than two-thirds were with first children;

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* Pract. Treatise on Midwifery, p. 199.

of Dr. Collins' thirty cases, twenty-nine were with first children; and of Dr. Johnston and Sinclair's sixty-three cases, forty-nine were primiparæ.

Causes.—Various and very obscure have been the explanations of the causes of puerperal convulsions. Dr. Locock thus enumerates them: "The immediate causes of puerperal convulsions are often very obscure. They appear sometimes to depend upon a loaded state of the brain; at other times the brain appears to be influenced by distant irritation, either in the uterus or digestive organs; and again, in some cases, puerperal convulsions are induced apparently by a peculiar irritability of the nervous system. It has been remarked, that there has been a greater disposition to puerperal convulsions in those patients who have been in early life subject to convulsive attacks, particularly of an epileptic character; and also in those who have suffered similarly in former labours, and have omitted those measures usually employed as precautions. That the uterine organs are in some way particularly implicated, is evident from the convulsions being of a character which may be said to be peculiar to the state of either pregnancy or parturition." "The immediate attack may be brought on by a loaded or disordered stomach, or by food, however small in quantity, of an indigestible kind. Some substances (shell-fish for instance) have been found very frequently to induce convulsions in the puerperal condition, when at other times they may have been taken by the same individual with perfect impunity. A sudden fright, afflicting intelligence, or any unexpected or depressing mental emotion, may excite the paroxysm; hence it has been long remarked, that unmarried women are more particularly likely to be sufferers from convulsions, from the shame and distress under which their children are usually born. The violent straining caused by labour pains, from the disturbance of the frame by the earlier uterine contractions, causing a temporary rush of blood to the head, will sometimes bring on convulsions."*

The application of Dr. Marshall Hall's theory, however, by Drs. Thompson, Murphy, and Tyler Smith, has thrown much light upon the matter. The former gentleman insists that no injury to the cerebrum or cerebellum can cause convulsions, so long as the true spinal system is not involved, in which Dr. T. Smith agrees with him. He then states that the proximate cause of puerperal convulsion consists in a morbid irritation of the true spinal system, and more especially of the medulla oblongata, propagated to it from the mucous surfaces, through the incident nerves of the excito-motor system.*

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* Cycl. of Pract. Med. Art.: Puerperal Convulsions.

Dr. Murphy† enumerates, among the proximate causes, morbid irritation of the uterus from hyperæmia or anæmia, and morbid irritation of other organs, and regards the whole as a beautiful illustration of the reflex nervous function; the peripheral nerves that supply the affected organ rapidly communicating their irritation to the spinal system, which, as an excito-motor centre, radiates the irritation over the whole of the voluntary muscles, and the muscles of respiration. Even the involuntary muscles, as the uterus and heart, do not escape.

Dr. Tyler Smith, in his admirable work, has entered into a most elaborate investigation of the causes of convulsions: after which he observes:—"In conclusion, to give a summary of the whole subject, the true puerperal convulsion can only occur when the central organ of this system, the *spinal marrow*, has been acted on by an excited condition of an important class of its incident nerves, namely, those passing from the uterine organs to the spinal centre, such excitement depending on pregnancy, labour, or the puerperal state. While the spinal marrow remains under the influence of either of these stimuli, convulsions may occur from two series of causes: those acting primarily in the spinal marrow, or *centric* causes; and secondly, those affecting the extremities of its incident nerves; causes of eccentric or peripheral origin. I. Causes acting immediately on the central organ:—1. Pressure exerted on the medulla oblongata by congestion, coagula, nervous effusion within the cranium. 2. Loss of blood. 3. Morbid elements in the blood. 4. The influence of emotion. II. Causes acting on the extremities of excitor nerves:—1. Irritation of the incident spinal nerves of the uterus and uterine passages. 2. Irritation of excitor nerves within the cranium. 3. Irritation of the incident spinal nerves of the rectum. 4. Irritation of the ovarian nerves. 5. Irritation of the gastric and intestinal branches of the pneumogastric nerves. 6. Irritation of the incident spinal nerves of the bladder. 7. As probable causes may be enumerated, irritation of the cutaneous nerves of the mammæ, and of the hepatic and renal branches of the pneumogastric. Though the subject distinctly admits of this division, several causes may act together, and centric and eccentric causes may be in operation at the same time. I have made no attempt at a division into predisposing and exciting, proximate and remote causes, as other authors have usually done, because it is evident that a cause which, in one case, is the exciting or proximate, may, in another, be the predisposing or remote cause."* Subsequently, Dr. Tyler Smith endeavours to explain the operation of the causes, and to trace the gradual progress from the slight commencement up to the completion of the convulsive paroxysm: but the investigation, though able, and full of interest, is too long for quotation, and I must refer my readers to his work, with an assurance that the perusal of the whole will abundantly repay them.

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* Essay on the Epileptic Form of Puerperal Convulsions. Ranking, vol. viii. p. 313.

† Lectures in Med. Gazette, Jan. 1849.

Among the most common *exciting* causes are usually enumerated intemperance in eating and drinking; mental emotion; fright, as in the case related by Denman, of a lady who was going on a party of pleasure, and whose carriage broke down; she was near the time of her lying-in, and was very much frightened, though she received no apparent injury. When she fell into labour, this was preceded by convulsions, in which she died undelivered.† Mr. Robbs has related a case‡ in which the convulsions seem to have been owing to the irritation of worms; at least, they ceased on the expulsion of two large lumbrici.

Atmospheric influence, according to M. Dugès,§ appears to have some peculiar effect in producing the disease, so that it assumes the character of an epidemic. This is confirmed by the observation of Dr. Ramsbotham, who observes:—"I have repeatedly remarked, among the numerous patients of the Royal Maternity Charity, as well as among others to whom I have been accidentally called, that several cases have occurred soon after each other. Whether this fact ought to be attributed to mere chance, or to the agency of some general principle upon the female system, I must leave to others to determine in future; but I am inclined to suspect that it may be ascribed to the latter principle. And here I may be allowed to observe, that I have witnessed the occurrence of several cases during warm weather; at a time when the clouds have been charged with electric fluid; when atmospheric appearances have threatened a thunderstorm, and when, perhaps, they have ended in one."‖ And most practitioners will probably have had occasion to remark the occurrence of several cases about the same time, as if they depended upon some general cause.

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* Parturition and Obstetrics, p. 306.

† Introd. to Midwifery, p. 429.

‡ Med. Gazette, Sept. 21, 1849.

§ Dict. de Méd. et de Chir. Prat., vol. vi. p. 511.

‖ Pract. Obs. in Midwifery, vol. i. p. 250.

In considering the exciting causes of the disease, we cannot overlook the condition in the urine. Hamilton* and Demanet† first stated that puerperal convulsions were liable to be preceded by anasarca, and their observations were confirmed by the highest authority. Sir James Simpson and Dr. Lever‡ were the first to connect this dropsy with that condition of the kidney which gives rise to the secretion of albumen, and since their time, the researches of Cahir and Bouchut, Rayer, Depaul, Cazeaux, &c., have confirmed and extended their observations. That in a large proportion of cases of convulsions there is albuminuria, with or without anasarca, there can be no doubt; but, on the other hand, albuminuria may occur without convulsions, and convulsions without albuminuria. For example, Dr. Blot§ found albumen in the urine of 41 pregnant women out of 205, and chiefly in primiparæ; and Dr. Litzmann‖ examined the urine of 131 females, 79 during pregnancy, 80 during labour, and 80 after delivery; albumen was present in 37, and absent in 95; of the 37, 26 were primiparæ. What is the exact relation between the two it is difficult to say precisely. I believe, with Sir James Simpson, that they both stand in the relation of the effects of another cause, viz., "a pathological state of the blood, to the occurrence of which pregnancy may some way dispose;"¶ or it may be that the excretion of albumen so discomposes the equilibrium of the component parts of the blood, that in their disproportion they give rise to these peculiar morbid effects. This seems to be the opinion of Dr. Braun,** who terms the disease "Uræmic Eclampsia," from "Uræmic intoxication of the blood," and he considers it analogous to the first stage of Bright's disease. Frerichs has pointed out the altered condition of the blood in pregnant women, viz., the increase of water and of fibrin, diminished quantity of albumen, diminution of the red and increase of the white corpuscles, as a subordinate cause.

Dr. Cormack has published an excellent paper on the connexion between renal congestion and puerperal convulsions.†† He considers that in many cases the latter are the toxicological results of non-elimination of the excretions of the blood, and that in the greater majority of cases this non-elimination depends upon renal congestion, caused by the pressure of the gravid uterus.

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* Duncan's Annals of Med., vol. v. p. 313.

† Recueil Périodique de la Société de Méd., vol. ix. p. 110.

‡ Guy's Hospital Reports, 1843.

§ L'Union Médicale, Oct. 10, 1852.

‖ Deutsche Klinik, May, June, July, 1850.

¶ Ed. Monthly Journal, Oct. 1852, p. 369.

** The Uræmic Convulsions of Pregnancy, Parturition, and Childbed. Translated by Dr. Matthews Duncan. A most valuable little work, to which I beg to refer my readers.

†† Lancet, April 13, 1850.

Many authors have assumed the previous occurrence of epileptic, as a predisposing cause of puerperal convulsions, as I did myself in the previous editions of this work, but I am induced to think this very doubtful. In the work from which I have quoted, Dr. Tyler Smith observes that "the suspected affinities between epilepsy and puerperal convulsion deserve attention. It would seem, *à priori*, that epileptics, or persons who have been subject to convulsions during infancy, would be far more liable than others to attacks of convulsion during the puerperal state. It would also seem probable that patients suffering from puerperal convulsion should become subsequently liable to epileptic attacks. But experience does not positively support either of these probabilities."* In a more recent publication he mentions, that in fifty-one pregnancies occurring in fifteen epileptic subjects, only two had puerperal convulsions,† and the experience of Drs. Hardy and M'Clintock confirms this view.

Of those cases of severe epilepsy before marriage which have come under my care, in one only was there any attack during gestation or parturition; whilst in the numerous cases of puerperal convulsions I have seen, I have not known one in which the convulsions returned in the absence of pregnancy.

There is a curious instance on record of periodical convulsions during the time of gestation only. "The wife of a citizen of Ferrara, twenty years of age, of a bilious constitution, and the mother of three children, was attacked with *periodical epilepsy* whenever she conceived, and sustained a paroxysm of that malady once a fortnight during the whole of her gestation; but as soon as she was delivered, the disease left her. Its occurrence, therefore, was always to her a sign that she had become pregnant."‡ I have seen a case something like this. A lady was attacked by convulsions of an epileptic character the first time she conceived, and they were repeated at the moment of quickening. She escaped an attack during her second pregnancy, but was seized at the moment of conception the third time. She passed through her labour without the least threatening of convulsion.

SYMPTOMS.—The symptoms of epileptic convulsions resemble very closely, if they are not identical with, those of ordinary epilepsy. In the majority of cases there are certain premonitory symptoms. The patient, for some time previous, suffers from pain in the head, giddiness, confusion, ringing noise in the ears, obscure vision, temporary loss of sensation, rigors, nausea, or even vomiting. The face is flushed, and the eyes injected. Dr. Hamilton, senior, mentions as peculiar, an intense pain in the forehead; and Dr. Denman, a severe pain in the stomach, and these, he thinks, are the worse kind of cases. Osiander has noticed a tumid state of the hands and face preceding the attack. Most practitioners are familiar with a dropsical swelling of the face alone, or face and upper extremities, which is not uncommonly followed by convulsions, and which we may regard undoubtedly as a precursory symptom, if the urine be at the same time albuminous. In some few cases, however, there are no precursory symptoms; the patient has no warning until the moment before she becomes insensible. The "aura epileptica" is seldom felt.

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* Parturition and Obstetrics, p. 323.

† Med. Gazette, 1849, vol. ix. p. 1074.

‡ Comm. by Lanzoni, Ephem. Germ., dec. ii. an. 10, p. 160.

As the attack approaches, these symptoms are aggravated; the pupils become dilated, the face more injected, the eyes fixed, and the patient loses consciousness.

During the attack, the face is swollen, of a dark red or violet colour, and distorted by spasmodic contractions; the eyes are agitated, the tongue protruded, and the under jaw repeatedly closed with force, so as to wound the tongue. A quantity of froth is ejected from the mouth, which is generally drawn more to one side of the face than the other. The muscles of the body are thrown into violent and irregular action; the limbs are jerked in all directions, and with such force that it is sometimes difficult to keep the patient in bed. The respiration is at first irregular, and being forced through the closed teeth and the foam at the mouth, has a peculiar hissing sound; it subsequently becomes nearly suspended. The pulse is quick, and, at the beginning, full and hard, but afterwards small and almost imperceptible. The body participates in the purple colour of the face. The urine and fæces are often passed involuntarily. This terrible paroxysm, however, is not of very long duration. After a period varying from five minutes to half an hour, the convulsive movements become less violent, and gradually subside; the countenance is less distorted, and assumes a more natural and placid appearance; the eyelids close, the respiration becomes more regular, though still sibilant, and the circulation is restored, the pulse becoming more perceptible, though still very quick; the patient rests quietly in bed, and the paroxysm has terminated for the time.

During the interval, the patient's condition is very variable. She may partially recover consciousness, so as to recognise persons around her, and to be aware of something extraordinary having happened, without knowing what, and without being able to express herself clearly. In other cases, the return of intelligence (but without recollection) may be complete until the approach of the next fit, accompanied with great weakness, headache, and confusion. These are the more favourable cases. Others, again, remain in a state of total insensibility, almost approaching to coma or asphyxia, with sibilant or stertorous breathing, and without muscular motion, or with a restless throwing about of the body and extremities. This calm is, however, of no very long duration; it may be half an hour, or two hours, but sooner or later the paroxysms return, to be succeeded by an interval which in its turn gives place to a paroxysm. I have known as many as eighteen paroxysms occur in twenty-four hours.

The urine, as I have already mentioned, is, in the large majority of women, albuminous. Dr. Lever remarks, "I have carefully examined the urine in every case of puerperal convulsions that has since come under my notice, both in the Lying-in Charity of Guy's Hospital and in private practice, and in every case but one the urine has been found albuminous at the time of the convulsions." And this has been confirmed by Simpson, Sabatier, Legroux, Richelot, Blot, Mascarrot, Braun, and others. More recent researches have thrown a good deal of light upon the occurrence of this renal affection. De Villiers and Regnault* observed it as early as the sixth month; Litzmann not till the eighth. The most characteristic symptom is dropsy of the hands, arms, and face; but dropsy does not necessarily coexist. "The quantity of albumen is usually very conspicuous, and increases as the time of delivery approaches. In proportion to the intensity and duration of the morbid process in the kidneys, are found casts of the uriniferous tubes in greater or less quantity, the epithelium lining them being sometimes normal, sometimes in a state of fatty degeneration. In the milder cases, the tube casts are often found just at delivery, or soon after. Careful examination will probably, in all cases, detect a not inconsiderable diminution of the urine."† Dr. Cormack and Dr. Litzmann attribute the albumen to mechanical pressure upon the kidney, by the enlarged uterus producing congestion of that organ, and they adduce as an argument the greater frequency of albuminuria in primiparæ. Neither regard it as the consequence of granular degeneration; and certainly, the temporary character of the pheuomenon is not consisteut with structural disease. M. Hasendonck also regards the albuminuria as the result of mechanical hyperæmia of the kidney, and quotes Finger, who examined the urine of 522 such cases, and found albumen in 155, of whom only 2 died of convulsions.* Dr. Seyfert attributes it to the disturbance of respiration and circulation. According to most observers, the albumen disappears within a short time; often forty-eight hours after delivery.

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* Arch. Gén. de Méd. 1848. Recherches sur les Hydropsies chez les femmes enceintes.

† Association Journal, Jan. 21, 1853, p. 64.

The termination of the attack varies in different patients; some remain in a state of half-stupor and great exhaustion for hours or days, and gradually recover. Other patients become maniacal, and may even remain so for a long time, and ultimately recover. I had a patient who remained in a state of mental derangement for several months before she was restored to health. In a few cases the patient continues comatose, and gradually passes into a state resembling apoplexy, and dies.

It is not always, however, that the recovery is complete. Sometimes the patient lies apoplectic, or in a state analogous; or she is deaf, or blind, or incapable of speaking, or both; or the limbs are paralysed. In fine, it seems as if the sensorium had received some permanent injury, the corresponding parts of the body suffering in consequence.† Cases of partial or complete paralysis are recorded by Lever, Simpson, and others, as a termination of convulsions.

I have already mentioned that convulsions may attack the patients either *during pregnancy*, at *the time of parturition*, or *after delivery*.

It will be necessary to say a few words upon its occurrence at each of these periods.

I. *Pregnant* women are more especially obnoxious to this disease during the latter two months of gestation, though it may occur at an earlier period, and at irregular intervals. The nearer the patient is to her confinement, the greater the risk of an attack, on account of the extreme distension of the uterus, and its increased irritability.

Although the beginning of labour may not be detected, either by an internal or an external examination at the outset of these attacks, yet during its continuance labour may commence, and run a natural course. In such a case, the fits will be found synchronous with uterine contractions, though not recurring with each. In many cases, however, the uterus remains perfectly quiescent, and gestation may be carried on for a time longer. In almost all cases the child is still-born, often putrid; but whether its death preceded the convulsions, or resulted from them, is not easily determined. When the former is the case, may we not attribute the convulsions to the dead child acting in some sort as a foreign body? Dr. Ramsbotham observes, "When the result proves thus satisfactory, the convulsions seldom return; but the woman rarely completes her full period of gestation. The process of labour commonly commences within the space of a few days; sometimes within that of twenty-four hours. Its progress is as regular and natural as if no previous derangement had taken place; but the child is too frequently still-born, and occasionally shows marks of approaching putrefaction."*

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* Arch. de Méd. Belge, Dec. 1853.

† Blundell's Obstetricy, p. 638.

The labour runs a natural course generally, and in a fair proportion of cases the mother recovers tolerably well, though there are startling exceptions, as in the following instance: "A lady, in the end of her pregnancy, was seized with convulsions; her attendant was sent for, and decided that there were no indications of labour, and that a stay was unnecessary. The midwife left the house, and returning early the following morning, the patient was found dead; the child, too, the birth of which no one seems to have suspected, lay lifeless beneath the clothes."† When convulsions occur at the commencement of labour, it might naturally be attributed, in some cases at least, to mal-presentation of the child; but this is not the case. Mal-presentation is observed very rarely in cases of convulsions.

II. *During labour*, the return of the paroxysm takes place at the commencement of a labour pain, although not with every pain. There is a greater expression of suffering from the uterine contraction than from the convulsion. The symptoms I have described appear to be more intense when the attack comes on during labour than during gestation. The uterine contractions do not appear to be impeded by the fits; the labour generally runs a natural course in the usual time, if not terminated by art; neither is it necessarily fatal to the infant, although there is great danger.

It is remarkable, and not easily explicable, that after the convulsions have ceased, and the labour is over, there is a great tendency to abdominal inflammation, adding fearfully to the mother's risk. Demuau, I believe, was the first to point out this fact, which Dr. Collins and others have confirmed; and which should be remembered in the treatment.

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* Ramsbotham: Pract. Obs. in Midwifery, p. 641, note.

† Blundell's Obstetricy, p. 641, note.

III. When the patient is attacked by convulsions *after delivery*, they generally occur from two to four hours after the birth of the child, sometimes later. There can be little hesitation in attributing them to some injury received by the brain or nervous system during labour, though we may not be able to specify the particular mischief. It does not, however, depend upon the length or difficulty of the labour; they occur as frequently after natural labour. The loss of blood at the time of delivery does not necessarily prevent the occurrence of the fit, though it adds to the danger by the debility it occasions.

Dugès considers cases of convulsions after delivery to be more tractable than any others, whilst Dr. Ramsbotham states exactly the contrary. I should say that the cases where the convulsions occur during labour, and continue afterwards, are the least manageable; next to these the attack during labour only; then, those after delivery; and lastly, the most favourable are those which occur during gestation. After recovery from the consequences of the attack, the patient may enjoy her usual health, and her subsequent pregnancies do not appear to be very liable to similar attacks.

Morbid Anatomy.—In the majority of cases, a *post-mortem* examination affords but little information. In many instances there is no deviation whatever from the healthy state of the brain;* in others, according to Braun, we find anæmia, œdema, and diminished consistence. Sometimes the vessels of the brain are turgid with blood; and in other cases there is a quantity of serum effused on the surface and base of the brain, or into the ventricles. The heart is generally flaccid and empty, and the lungs of a pale colour. Some fluid is occasionally found in the pleura, or pericardium. Traces of inflammation have also been discovered in the peritoneum. In a few cases the spleen is unusually large and the kidneys congested. Dr. Braun states that they may exhibit one or other stage of the three forms of Bright's disease. He has given a very minute account of the appearance to be observed, but it is too long for insertion, and I must refer the reader to his work.

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* Boutcilleux: Thesis. Paris, 1816. Lachapelle: Traité des Accouch., vol. iii. p. 23. Cruveilhier: Distribution des Prix à la Maternité, Paris, 1830, p. 31. Baudelocque: Thesis, p. 65. Ciniselli: Ann. Univ. di Med., vol. lxix. p. 472.

DIAGNOSIS.—1. *From hysteric convulsions.*—In the attack I have just described, there is a *total loss of consciousness*, great muscular action, frothing at the mouth, frequent recurrence of paroxysms, and incomplete restoration or total insensibility during the intervals. In hysteric convulsions, on the contrary, the patient scarcely loses consciousness, exhibits only moderate spasmodic action, has no frothing at the mouth, does not suffer from a frequent recurrence of the fits, and recovers shortly after each. The sobbing, sighing, weeping, and screaming of the hysteric convulsion are also peculiar to it.

2. *From apoplectic convulsions.*—In epileptic convulsions, the whole body is thrown into violent spasms, which are repeated, with intervals of quiescence, and often of partial return of sense. The breathing is rather sibilant than stertorous, and the muscles preserve their tone even during the intervals; whereas in apoplectic convulsions, the spasmodic movements occur at the commencement, and are not repeated; sense and sensibility are totally lost, the breathing is stertorous, and the muscles lose all power, so that the arm when raised, and allowed to fall, does so like that of a person recently dead.

PROGNOSIS.—On the whole, the mortality is considerable, though probably much less so than formerly. Jacob states that in his time scarcely any survived. Dr. Parr, in his Medical Dictionary, that six or seven out of ten die. Dr. Hunter, that the greater proportion were lost. And we have found that about one in four and a half are lost.

TREATMENT.—The division of convulsions into sthenic and asthenic is of great value as regards the treatment. When the patient is pale, exsanguine, and weak, it is clear that much caution must be used in abstracting blood. Of course it may be advisable, but our main reliance must be upon counter-irritation to the head and neck, cold in moderation, calomel, opium, and, I believe, upon anæsthetics. In the sthenic form, when the head is hot, the face flushed, and the pulse full, firm, and frequent, as soon as possible after the convulsion, the first thing to be done is to take away blood from the arm or temporal artery, largely, and in a full stream. If the paroxysms continue, this may be repeated. Denman took forty ounces and Blundell seventy ounces of blood from a patient under these circumstances. We are not to be deterred from a free use of the lancet by the absence of immediate relief—the benefit is rather in the ultimate and early recovery of the patient, than in the immediate arrest of the paroxysms. "The quantity likely to suffice for the relief of a case of only threatened convulsions might amount to between twenty and thirty ounces; but if the convulsions are supposed to have been long established, or to have taken place very suddenly, the practitioner would have to take away perhaps thirty or forty ounces of blood, or even *fifty*, in cases of great intensity of the symptoms. The rule should be, that the pulse must be reduced into a state of mellowness and softness before the arm is allowed to be tied up. In a few extreme cases, in which the author has from time to time been consulted, he has considered it necessary to order a second bleeding, after the lapse of two or three hours subsequently to the former one. But he has never, that he recollects, recommended for the second bleeding the abstraction of more than fifteen ounces of blood."* Another good effect from venesection is the prevention of the abdominal inflammation, to which we have seen that the patient is exposed subsequently. If there be any objection to repeating the venesection, leeches may be applied; or if the patient be sufficiently quiet, the nape of the neck may be cupped. Dr. Braun is very justly opposed to bleeding in anæmic eclampsia, as not only having no good effect, but as producing irreparable injury.

A strong purgative (calomel and jalap, for example) should next be administered, as from the free evacuation of the bowels great benefit is generally derived; and it may also excite uterine contractions, and hasten the delivery.

The head may then be shaved, and cold lotion or ice applied. Denman speaks highly of cold affusion. He says, "On a patient in convulsions who had been bled, and for whom many other means had been fruitlessly used, I determined to try the effect of cold water. I sat down by the bedside, with a large basin before me, and a bunch of feathers. She had a writhing of the body, and other indications of pain, evidently occasioned by the action of the uterus before the convulsions; and when these came on, I dashed the cold water in her face repeatedly, and prevented the convulsions. The effect was astonishing to the bystanders, and indeed to myself. On the return of the indications of pain, I renewed the use of the cold water with equal success; and proceeded in this manner until the patient was delivered, which she was without any more convulsions, except once when the water was neglected."† A warm bath has been recommended, but besides that its value is doubtful, it would in most cases be very difficult to administer it.

After the lapse of some time, the head and nape of the neck may be covered with blistering plaster, as counter-irritation will materially further the restoration of the patient.

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* Davis's Obstetric Medicine, vol. ii. p. 1027.

† Midwifery, p. 435.

When, after copious bleeding and purging, the attack is somewhat subsiding, it has been recommended to give an opiate. Considerable difference of opinion has existed upon this point, owing, I think, to the different parties not specifying with sufficient accuracy the time at which it should be administered, and the cases suitable for it. Under the circumstances I have mentioned, it seems to be the opinion of the highest authorities that it may be of service. Dr. Collins remarks: "Many of our best writers have actually condemned the use of opium in convulsions, stating it to be most injurious—some even destructive. Ample experience has convinced me that it is not only harmless, but *highly beneficial* in those cases where the fits *continue after delivery*. And I should hope the cases adduced will prove satisfactorily that it is also useful under many other circumstances, when proper steps had been previously taken. Its combination with tartar emetic, and occasionally with calomel, is most advantageous." Calomel, given so as to affect the constitution, has been found beneficial. Dr. Collins speaks very highly of tartar emetic with opium, in doses sufficient to produce nausea, but not vomiting. "In every severe case of convulsions, after having carried into effect the ordinary mode of treatment, as *bleeding freely, acting briskly* on the bowels with calomel and jalap, and at the same time adopting the means usually had recourse to for protecting the patient during a paroxysm, I endeavoured to bring her under the influence of tartar emetic, so as to nauseate effectually, without vomiting. With this view, a tablespoonful of the following mixture was given every half-hour:—

℞ Aquæ Pulegii, ℥viij.
Tartar. Emetici, gr. viij.
Tinct. Opii, gtt. xxx.
Syr. Simpl. ʒij. M.

"In some cases the quantity of tartar emetic used was only four grains to an eight-ounce mixture; and in others, the quantity of opium was somewhat increased."

It will be necessary to insert a wedge of leather or wood between the teeth, to prevent injury to the tongue, and also to remove everything out of the way, by striking against which the patient might hurt herself. This treatment applies equally to convulsions occurring before, during, or after labour—except that in the latter case venesection must depend on the state of the patient.

Very recently it has been proposed to administer anæsthetics, so as to produce insensibility, in hopes, at the same time, of calming the convulsions; and certainly, so far as we can fairly judge from the cases on record, it appears a most valuable and successful remedy. Dr. W. Channing, of Boston, U.S., has used ether in ten cases; six mothers recovered and three children, a larger proportion than when ether was not used.* Mr. Turner, of Mansfield, administered chloroform in a case of convulsion after delivery, with perfect success. When given on the approach of a fit, it arrested it at once. The patient recovered.† Dr. Keith gave it in convulsions occurring during pregnancy. It quieted the fits, and when labour came on, the patient was placed completely under its influence, and kept so until delivery. She recovered well, and with no recurrence of the attacks.‡ In a case related by Mr. Morris it was equally beneficial.§ In a case which occurred at Gosport, the inhalation was continued for three hours after the patient had had thirty-three fits, and the success was complete.|| Dr. Shekleton, the late master of the Dublin Lying-in Hospital, has tried it in nine cases: in five the convulsions were completely arrested, and in four they were lessened in intensity and frequency.¶ Mr. Bolton had recourse to it after bleeding and opium had failed, and with great success.** I have tried it in several cases with great benefit. Dr. Braun tried it in sixteen cases, all of which recovered completely.

The next important question is, *whether we are to interfere with the progress of gestation or parturition.*

I believe it is the general opinion that, until labour sets in naturally, interference would be injurious; so that in convulsions during gestation, we have nothing to do with the uterus, but must confine ourselves to the treatment of the convulsive disease, and it is more especially useful if we have to deliver artificially.

If the attack take place at the commencement of labour, some practitioners have been anxious to hasten the operations of nature by manual dilatation; but this has been abandoned, and very properly, as likely to increase the convulsions, without advancing the progress of the delivery.†† Belladonna has been applied to

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* On Etherization in Midwifery, pp. 307, 330.

† Lancet, Jan. 12, 1850, p. 53.

‡ Ed. Monthly Journal, Aug. 1850.

§ Ibid., May, 1849, p. 767.

|| Med. Times, March 23, 1850, p. 229.

¶ Dublin Journal of Med., Aug. 1852, p. 100.

** Lancet, Jan. 29, 1852, p. 108.

†† Denman's Introduction to Midwifery, p. 430.

the cervix uteri, for the purpose of dilatation, but I should doubt its utility, and dread its poisonous effects.* The old writers, with some moderns, have proposed incision of the cervix, but the risk would outbalance any benefit to be derived from so "heroic" a remedy. But supposing the os uteri to be dilated or dilatable, are we then to proceed to deliver by art? This question has been much debated, and opposite opinions have been advocated. Some advise instant interference, and others no interference at all.† The true plan seems to be to avoid both extremes. We are not necessarily to interfere at this stage of the labour, beyond rupturing the membranes, which sometimes hastens the progress of the labour. Version, or turning, has been often recommended, but, from all the cases I have seen or collected, it would appear a most hazardous measure. Dr. Ramsbotham advises it, and yet the three cases he relates in which he practised it, proved fatal. Five patients out of seven are generally lost. Dr. Collins is strongly opposed to it. We may therefore conclude that version is not to be attempted unless it should be proved that chloroform will secure the patient from a recurrence of the convulsions on the introduction of the hand.

But when the head has descended into the pelvis, so as to be within reach of the forceps, and there is sufficient space, it will be proper to apply that instrument, inasmuch as delivery, when it can be accomplished, is essential. The attempt must be made during an interval between the paroxysms, and under chloroform, but should the introduction of the blades bring on a violent fit, it will be necessary to withdraw them, lest they should be forced through the vaginal or uterine parietes during the struggles of the patient.

Dr. Braun considers that craniotomy is never to be practised in convulsions without there be disproportion. In this I cannot agree with him. If the os uteri be dilatable, the pains feeble, and the convulsions very severe, we cannot hope that the mother will escape after so many hours of such suffering, whereas we know that her best chance is delivery, and the chances of the child are very doubtful. We dare not turn, but we can craniotomize the child, and deliver, and if the child should be dead, it will be our duty to do so. Even if it be not, as forty-five per cent. are lost, it will be a question whether in neglecting to deliver for the sake of affording the child this bare chance of life, we do not thereby sacrifice the mother. In the worst case of convulsions I ever saw, to which I was called some time ago, I had no hesitation. The fits occurred with the first pains, were often repeated, the patient was comatose and insensible, the os uteri dilated to the size of a crown-piece in twelve hours. I felt that the patient would probably die before the completion of labour naturally, and I therefore perforated and extracted the child (under chloroform), and the patient recovered, after an insensibility lasting nearly three days. Moreover, if the child be dead at any period of labour at which we may be called, craniotomy affords the most speedy means of delivery. And lastly, when the head is in the pelvis, if the space is too small for the forceps to be applied, as the child cannot be saved, we ought to have recourse to this operation as soon as we are satisfied of the state of the case.

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* Blundell's Obstetricy, p. 950.

† Denman's Introduction, p. 425.

After the convulsions have ceased, Dr. Collins remarks—"Should the patient become maniacal, as is occasionally the result when the fits have been severe, and have continued for any length of time after delivery, all local distress, as pain in the head, or any symptom that would indicate abdominal complication, should be diligently looked after, and treated accordingly; as by so doing, keeping her fully under the influence of tartar emetic, at the same time acting well on the bowels, and excluding light from her room, as also all other external irritants, the best results may be expected. It is a great satisfaction to the friends of the patient in such a situation to be assured that there is little liability to a return of this derangement of mind, as is the case in most other forms of mania."

PROPHYLACTIC TREATMENT.—When we are consulted by a patient during pregnancy who presents any of the threatening symptoms before noticed, such as headache, giddiness, occasional blindness or double vision, and especially if these be combined with anasarca of the face and other extremities, and with albuminuria, there can be no doubt that active measures are required. Brisk purgatives, with venesection, or cupping the loins, if suitable and the patient can bear it, should be adopted, with small doses of tartar emetic or diaphoretics, moderate exercise, and a regulated diet.

All pressure should be removed, the lungs be allowed full play, and, if we believe, with Dr. Cormack, that the pressure of the gravid uterus upon the kidneys causes the albuminuria, then the patient should avoid the supine position as much as possible.

On the other hand, these symptoms may accompany an impoverished state of the blood, and the patient will require a good diet, with tonics. Cold or counter-irritation to the head may, at the same time, be necessary. Both Frerichs and Litzmann state that they have found benefit from benzoic and acetic acids. If the renal disease have existed for some time, our treatment must be less active: cold and counter-irritation, with gentle purgatives and acids. Diuretics are to be avoided, but counter-irritants to the loins, by means of mustard poultices, will be useful.

When convulsions occur before labour sets in, we are advised by Chailly, Pietra Santa, Sabatier, Braun, and Daniel, to bring on premature labour, and M. Bouchacourt, of Lyons, succeeded once in this way. MM. Legroux and Richelot doubt the propriety of this, and I agree with them; inasmuch as labour, when it comes on, is not necessarily accompanied by a recurrence of convulsions, especially if some time has elapsed since the attack.

III. Apoplectic Convulsions.—This variety seldom or never occurs, except towards the termination or after the conclusion of labour. Dr. Burns,* indeed, mentions its occurrence at the commencement of labour, and MM. Morithout† and Menard‡ at the sixth month of pregnancy.

Causes.—It is evidently caused by the stress upon the cerebral vessels during the labour pains.

It is very probable that anxiety of mind may predispose to the attack; at least in one case I saw this appeared to be the case.

Symptoms.—In many cases the patient suffers from pain and throbbing in the head for some days previously; but in others there are no premonitory symptoms. Generally speaking, during the labour the patient complains of headache; and during the second stage the face may be observed to be much flushed, and the eyes injected. Strictly speaking, there is but little convulsion; the body and extremities are agitated or thrown about for a short time, and then the patient lies in a comatose state. There is little or no distortion of the face, and no frothing at the mouth. The muscles become flaccid and powerless; the respiration is stertorous; there is no return of intelligence, and rarely any repetition of the paroxysm, though such cases have been recorded. The pulse is full and slow, and the pupils in some cases dilated, in others contracted, but in all insensible to light. In almost all cases the condition of the patient remains unaltered until death; but there are a few cases, answering, I presume, to the congestive apoplexy of Abercrombie and Lallemand, where our timely aid is successful, and the patient recovers sense and motion; and, if proper care be taken, is speedily well.

I do not know that I can give a better illustration of this disease than by relating the two following cases. For the first I was indebted to my friend the late Dr. Aston; it appears to be a simple case of apoplexy from congestion: the second occurred in the practice of a dispensary to which I was attached. I quote them from a report I published some years ago in the Medical Gazette. "Catherine Costello, aged eighteen years and nine months, of low stature and corpulent figure, complained first of severe headache on Wednesday, January 2nd, 1833. The pain was more violent than any of the kind she had ever experienced. Sickness of the stomach set in nearly at the same time, and she continued throwing up green bilious matter during the entire day: the bowels were confined for four days; the face and extremities were much swelled, which commenced two days before, and continued gradually to increase as the headache became more intense. She wanted about seven weeks to complete the usual term of utero-gestation. I [Dr. Aston] was sent for in the evening; she was walking about the room, but suffered most acutely; the face was swelled to such a degree as almost to hide the eyes, and her speech was somewhat thick. The motion of the child had not been felt all day. As she had an objection to bleeding, I omitted it for the present, and directed some opening medicine to relieve the bowels; and having given the requisite directions, I left her; but in a few hours her husband came for me in all haste, requesting my immediate attendance, as she had had a fit, and appeared to be in a dying state. Upon further inquiry, I was told that the pain in the head got much worse, when suddenly the eyes became fixed, the face distorted, convulsive motions ensued, and ended with stertor, which must have been of short continuance, as no such symptoms existed when I visited her a short time afterwards, *although she was unconscious of anything that happened until after venesection*, which I immediately performed to the extent of eighteen or nineteen ounces, from which she experienced almost instantaneous relief. The heat of skin was much greater than natural; thirst extremely urgent; pulse pretty frequent, but inclined to hardness; after venesection it became quicker; shortly after, slower and softer, until it gradually came down to the natural standard. From this time all the symptoms subsided, and she was delivered January 5th, and recovered well."

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* Midwifery, p. 527.

† Trans. Méd., vol. v. p. 162.

‡ Ibid., vol. iv. p. 241

"Mary ——, aged thirty, was attended in her first confinement by a pupil of the Wellesley Dispensary, on Monday, November 20th, 1832. The labour was natural, and terminated within the usual period. She complained of severe headache during her labour, and seemed sleepy towards the conclusion. After asking some question of the attendants, she settled to sleep; some irregular motions of the limbs were noticed by those in the room, but nothing further, until her breathing became loud and heavy, when, as they could not rouse her, I was sent for. I found her perfectly insensible; pupils fixed and contracted; breathing stertorous; heat of head but little increased; abdomen distended with flatus; muscles perfectly flaccid; pulse firm, and tolerably full. The usual remedies were tried, but unsuccessfully, and she died during the night. A *post-mortem* examination was permitted, and we found great effusion of blood, filling both ventricles. A quantity of serum also was found at the base of the skull. On further inquiry, I learned that she had been the victim of seduction and desertion, and that she had suffered from depression of spirits and severe headaches for some weeks before her confinement."

PATHOLOGY.—The brain may be found greatly congested, but without any effusion; but this I believe to be rare. There may be great effusion of serum, which by its pressure will cause symptoms of apoplexy. More frequently blood is poured out into the ventricles, into the substance of the brain, or at its base. Cases of this kind have been noticed by Denman, Targioni, Marchais, Lachapelle, Leloutre, Schedel, Velpeau, &c.

DIAGNOSIS.—The entire and persistent insensibility, the absence of repeated paroxysms with their accompanying symptoms, will at once enable us to distinguish apoplectic from epileptic or hysteric convulsions.

It is not easy to distinguish that form which arises from congestion from that caused by effusion, the chief difference being in the intensity of the symptoms.

TREATMENT.—The most active antiphlogistic measures should be instantly put in requisition; a large quantity of blood should be taken from the arm, jugular vein, or temporal artery, and repeated if necessary. This is the more requisite, as it is from the effect of bloodletting that we are mainly to look for the distinction between apoplexy from congestion, and apoplexy from effusion. If no relief whatever be afforded, the case may be regarded as nearly hopeless; but if the patient be at all benefited, the head should then be shaved, and ice applied. After a short time a large blister may be applied to the head or neck, and a brisk purgative given.

These remedies will generally afford relief in those cases which are susceptible of it, and they may be modified or repeated as circumstances may require. Should this variety occur during labour, and the uterine action be suspended, it will be desirable to deliver the patient as speedily as possible, so as to save the child; and for this purpose, if the head be within reach, the long or short forceps should be applied.

CHAPTER XXIV.

PARALYSIS OCCURRING DURING GESTATION AND IN CHILDBED.

HAVING been much interested by a case of paralysis after delivery, to which I was called in consultation, I was induced to make some inquiry into the occurrence of the disease, not merely after delivery but during gestation, and to examine the authorities within my reach, in order to collect from them all the information they contain; but I am sorry to say that my search has not been very fruitful in results. Bearing in mind that paralytic affections may occur as a termination of convulsions, as well as independently, I carefully looked over the principal obstetric writers; and in the works of Giffard, Ould, Exton, Smellie, Chapman, Pugh, Burton, Moore, Foster, Perfect, Osborn, Spence, Hamilton, Denman, Burns, Merriman, Blundell, Collins, Davis, Lee, Murphy, and Hardy and M'Clintock, I have found no mention of the disease.

Dr. Campbell has a short section on paralysis of the pelvic extremities, which, he observes, "may be either partial or complete; and in all the cases which I have seen is confined to one of the limbs. It must be owing to the long duration of the head in the pelvis, from disproportion and consequent injury to the pyriformis muscles or great sacro-sciatic nerves. The partial variety is what we generally meet with, and in either it is a protracted complaint, without the patient, however, in any instances that I have seen, becoming permanently lame."* Dr. Ryan observes that "some women, after the easiest as well as after instrumental delivery, are attacked with paralysis of the lower extremities, which is generally attended with retention of urine. The disease usually disappears in a few weeks."† Dr. F. Ramsbotham states that "paralysis of one or both legs, in very various degrees, occasionally happens after labour; more frequently when the process has been tedious and painful; but sometimes, when it has been of ordinary duration, or even of unusual rapidity. It

* Midwifery, p. 406.

† Manual of Midwifery, p. 661.

is not attended with cerebral affection, and is dependent on the pressure which the muscles and nerves have sustained during the passage of the child's head through the pelvis. There is pain or numbness both within that cavity and around the hip, and an inability to move the limb with freedom. It generally disappears by degrees within a few days; at other times it continues beyond the period the patient usually remains in bed, and compels her, when she rises from it, to use a stick or a crutch." Again, "hemiplegia, indeed, may appear after delivery as well as at other times, but there will be particular symptoms, independently of the local affection, which are too well known to require mention from me here."* Dr. Dewees has given two cases of convulsions, followed by temporary blindness;† but this is the only reference to the subject in his works, or those of Dr. Meigs. I have not been more fortunate in my search among systematic writers on diseases of women, for neither Leake, Hamilton, Blundell, Hall, nor Ashwell, makes mention of either paraplegia or hemiplegia.

I find as little notice of these affections in French or German obstetric works. I have examined the writings of Saccombe, Boivin, Lachapelle, Baudelocque, Maygrier, Gardien, Velpeau, Moreau, Chailly, and Jacquemier, of Carus, Joerg, Wigand, and Busch, on midwifery; and of Nauche, Capuron, Joerg, and Siebold, on diseases of women, without having been able to find an allusion to it. The recent work of M. Scanzoni is the only one in which it is noticed. He has a chapter on paralysis of the lower extremities, in which, admitting that it may in some cases be owing to pressure, yet as it may not appear till some time after labour, and as a similar affection may attack the upper extremity, he considers that pressure cannot be the sole cause, but that it may be attributed to some more profound derangement.‡ He has given a case which I shall quote hereafter.

This paucity of information in systematic obstetric works, it occurred to me, might be owing, not solely to the rarity of the disease, but partly to the opinion that the disease belonged more properly to the department of general medicine, and that, perhaps, I should find more information in works treating of the practice of physic generally, or of diseases of the nervous system in particular. I have, therefore, consulted such as are within my reach, but with very limited results. The disease, as connected with pregnancy or childbed, is not mentioned by Hasse, Rokitausky, or Abercrombie, but the latter distinguished observer has some observations so apposite to the cases which I shall relate presently, that I shall take the liberty of quoting them. He states that an attack of paralysis may*—"1. Be merely the prelude to the apoplectic, and may pass into it after a short interval. 2. The attack may, under proper treatment, pass off speedily and entirely, leaving, after a very short time, no trace of its existence. 3. The recovery may be very gradual, the use of the affected limbs being restored after several weeks or months. 4. The palsy may be permanent, &c. &c." And again he remarks, that "the whole phenomena of palsy do indeed bear evidence that certain cases of it depend upon a cause which is of a temporary nature, and capable of being very speedily and entirely removed. We see hemiplegia take place in the highest degree, and yet very rapidly disappear; but the most singular circumstance connected with certain cases of palsy is, that we occasionally see it continue without any improvement for many weeks or months, and then, from some change which entirely eludes our observation, take a turn for the better, and entirely disappear." Dr. Todd† mentions the fact, that anæsthesia of the face sometimes occurs after parturition, and also that paralysis may occur, and that it is sometimes coincident with phlegmasia dolens. Dr. Cooke, in his work on Nervous Diseases, does not treat of paralysis in connexion with pregnancy or parturition, but he notices a curious fact, which is illustrated by one of the cases I shall detail—namely, that patients with hemiplegia are sometimes unable to utter the exact word they wish, to express their meaning, either from forgetting it, or from a difficulty in pronouncing it. Dr. Graves, in his admirable observations on the Pathology of Nervous Diseases, when treating of the centric or excentric origin of certain forms of paralysis, remarks: "I shall endeavour to prove, first, that paralysis (from whatever cause) affecting one portion of the circumferential extremities of the nerves, may also affect other portions of their extremities; secondly, that pain originating in one situation may produce a similar sensation in distant parts; and thirdly, that convulsions, resulting from irritation in any part of the extremities of the nervous system, may occasion a corresponding train of symptoms in other parts of the body."‡ Although I think that these observations bear directly upon the affection under consideration, they were not associated in Dr. Graves' mind, for he makes no allusion to paralysis occurring before, during, or after labour. In Dr. Watson's Practice of

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* Obstetric Medicine and Surgery, p. 518.

† Midwifery, p. 548.

‡ Lehrbuch der Geburtshülfe, p. 1000.

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* Diseases of the Brain, &c., pp. 624, 248.

† Cyclopædia of Practical Medicine, vol. iii. p. 213.

‡ Clinical Medicine, by Neligan, vol. i. p. 501.

Physic there is a very full and able account of the different varieties of palsy, but no mention of its occurrence in pregnancy or childbed; nor yet in the more recent special treatise of Dr. Copland.

I may further observe, that in none of these works is there any notice of the condition of the urine previous to or immediately after the attack. The only author who up to this period seems to have suspected a connexion between serious nervous affections and certain states of this secretion is Dr. Latham, who, after enumerating various diseases attended with or caused by albumen in the urine, says of the brain, "And some of its graver affections will come and go, and admit of a present relief, which is unusual where harm has befallen its own structure: convulsions and apoplexies appear and disappear, and yet are ultimately fatal, the chief concomitant circumstance which attracts our notice being albuminous urine."* Dr. Romberg, in his valuable work, recently published by the Sydenham Society, has a section upon "paralysis depending upon affections of the sexual organs,"† which is of such interest that I trust a pretty long quotation will be excused. "The female sex," he observes, "offers peculiar opportunities for the study of paralytic attacks connected with morbid conditions of the sexual system: they arise either from direct pressure of the distended uterus or ovary upon the nervous plexuses of the lower extremity, and are then only unilateral, and accompanied by derangement of sensibility, as pain, numbness, or loss of sensation: or they are caused by a reflex influence upon the spinal cord, and then affect both sides of the body. Veterinary surgeons have repeatedly met with the complication of paraplegia and metritis; Gelle‡ quotes eleven cases of acute metritis in cows, which had followed calving; in all, the power of moving the hind legs was diminished, while sensibility continued unimpaired. Sewell§ publishes the sectio cadaveris of a cow attacked with paraplegia following calving; intense inflammation was found in the uterus and vagina. Ithen|| has communicated a few cases of metritis in mares, which was accompanied by inability to stand and to raise themselves on their hind legs. Dr. Hunt¶ has observed similar occurrences in women. Lisfrane** details the case of a lady,

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* Diseases of the Heart, vol. ii. p. 299.

† Diseases of the Nervous System, vol. ii. p. 399.

‡ Journal Pratique, &c., 1826.

§ Veterinarian, vol. iv. p. 509.

|| Nebel und Vix: Zeitschrift für die Gesam. Thierheilkunde, vol. iii.

¶ Stanley, p. 274.

** Journ. de l'Anat., de la Physiol., et de la Pathol. du Système Nerveux, 1813, vol. i. p. 154.

aged thirty-six, who had gradually been attacked with paraplegia, without any loss of sensibility. All the remedies applied on the assumption of a disease of the spinal cord remained unavailing. Lisfranc made a vaginal examination, and found the fundus uteri so much enlarged as almost to fill the pelvis; after using the iodide of potassium and iodine frictions for three months, and taking the waters at Barége, the tumefaction of the uterus was reduced, and complete recovery was obtained in two years." "Paralysis of the lower extremities often supervenes during confinement and even after easy births, without pain having preceded or being associated with it; and the accoucheurs attribute it to compression of the sciatic plexus and obturator nerve, for which there is no warrant whatever. There would be more justice in assuming that an accumulation of serous fluid had taken place in the spinal canal, resulting from disturbance of the circulation, as we find in tumours of the abdominal cavity; but morbid anatomy does not afford any proofs of the fact. No such condition, however, is necessary, as demonstrated by a case which recently came to my notice, and in which the uterus was atrophied. A woman, aged forty-one, had, since the cessation of her catamenia six years previously, frequently suffered from twitching of the inferior extremities, and for nine months past mobility had been diminished; there was a frequent tremor and sense of weight in the legs. The cutaneous sense of touch was dull in the feet, especially in the left, in which the disease had commenced with lacerating pains. Retention of urine alternated with eneuresis, especially at night. The upper extremities continued in the full possession of their vigour. No abnormity was discoverable in the spinal cord. Dr. Schöller, whose accurate method of exploration is well known, found that the vagina was much shortened, and that there was no portio vaginalis, only the transverse fissure of the uterus remained visible at the arch of the vagina, directed from before backward. The os tincæ was very soft, and the neck presented the usual hardness; it was evident that the sexual system had undergone a process of involution, as in an old woman. I ordered the alkaloid of the nux vomica, strychnine, in doses of a quarter of a grain, twice a day, and friction of the legs with the ethereal oil of turpentine; after continuing this treatment for three weeks, a favourable effect was experienced."

A friend very kindly undertook a tolerably extensive search among the periodicals, but, with two remarkable exceptions, nothing on the subject was found. These two exceptions were, a paper by the late Dr. Lever of London, and one by Sir James

Simpson of Edinburgh. With both of these gentlemen I have been in communication, and from both I have received additional matter, a favour the value of which has been doubled by their frank, kind manner of conferring it, and for which I take this opportunity of returning my warmest thanks.

Dr. Lever's cases of paralysis form part of an interesting series, illustrative of certain nervous affections of pregnancy; and in support of his conclusion that "pregnancy is occasionally associated with chorea, or convulsive movements; with paralysis of various parts of the body, of the extremities, and of the nerves of special sense; and with mania."* The varieties of paralysis he describes are amaurosis, deafness, hemiplegia, loss of power in both upper extremities, loss of power in the right lower extremity, &c. &c. I shall take the liberty of giving an abstract of these by-and-by.

Sir James Simpson's communication, published in the same year, consists of some observations made at the Edinburgh Obstetrical Society, from which I shall extract as much as relates to the subject before us at present. "1. Albuminuria, when present during the last periods of pregnancy and labour, denotes a great and marked tendency to puerperal convulsion. 2. Albuminuria, in the pregnant and puerperal state sometimes gives rise to other and more anomalous derangements of the nervous system, without proceeding to convulsions; and Sir James Simpson had especially observed states of local paralysis and neuralgia in the extremities, functional lesions of sight (amaurosis, &c.) and hearing; hemiplegia and paraplegia more or less fully developed. . . . . . . 5. Albuminuria and its effects are far more common in first than in later labours, and then constitute a disease which generally disappears entirely after delivery. But Sir James Simpson had seen one case commencing with slight blindness, but no œdema, and ending gradually in hemiplegia, where the palsy remained after delivery, and after the disappearance of the albuminuria. In another, amaurosis came on with delivery, and had been present for six months when Sir James Simpson first saw her. She had no œdema or other symptom of albuminuria, but in testing the urine, it was highly albuminous. 6. Albuminuria with convulsions, &c., occurring in any labour later than the first, generally results from fixed granular disease of the kidney, and does not disappear after delivery. 7. Perhaps in puerperal convulsions, &c. produced by albuminuria, the immediate pathological cause of the nervous lesion is some un-ascertained but poisonous state of the blood. Was there a morbid quantity of urea in the blood? In several specimens of the blood of patients suffering under puerperal convulsions, furnished by Sir James Simpson to Dr. Christison and Dr. Douglas Maclagan, these gentlemen had been unable to detect any traces of urea. Was the poisoning material caseine in morbid quantity or quality? The dependence shown by Gluge and others of albuminuria upon stearosis of the kidney, makes this connexion worthy perhaps of some inquiry." "9. Sometimes hemiplegia supervened during pregnancy, without albuminuria, but this form did not seem to interfere materially, or very dangerously, either with the pregnancy or labour; the disease running its own course. In one case, Sir James Simpson had seen the patient gradually but imperfectly recover the use of the palsied arm after delivery. In another, no improvement occurred.*

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* Guy's Hospital Reports, 1847, vol. v. p. 1.

Let us now see to what the information we have obtained from these different authorities amounts. Very briefly, we find:—

1. That hemiplegia, paraplegia, or partial paralysis, may occur previous to, during, or some time after labour.

2. That by some authors the paralysis, in paraplegia especially, is attributed to pressure upon the muscles or nerves in prolonged labour; but this is also denied, as the same disease follows easy labour, or occurs after the lapse of some days.

3. Paralysis may terminate convulsions or accompany them.

4. Paralysis may be the consequence of organic disease, or of effusion into or upon the brain or spinal marrow.

5. Paralysis may result from reflex action.

6. The palsy may depend upon temporary causes, and among such causes albuminuria may be included.

7. Hemiplegia may run on into apoplexy, or it may pass off in a few weeks, or sometimes more slowly. Paraplegia may leave a temporary or more permanent lameness: the local palsies (amaurosis, deafness, &c.,) generally last but a moderate time.

8. A nervous or hysterical paralysis may occur occasionally in the unimpregnated state, or during pregnancy, but that it seldom continues after delivery.

I shall now proceed to give a short abstract of such cases as I have been able to collect from authorities, or from my professional friends, or which I have seen myself. Among the former, I am indebted to Dewees, Scanzoni, Crosse, Beatty, Lever and Simpson, and, among the latter, to Drs. Lever, Simpson, M'Clintock, Beatty, Forest, Ireland, and Duke. I shall first give those in which the paralysis occurred during pregnancy; then those in which it occurred at the time of labour; and lastly, those in which it followed parturition.

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* Edinburgh Monthly Journal, Oct. 1847, p. 288.

I. Paralysis occurring during Pregnancy.—Case 1.* —*Hemiplegia partial.*—Mrs. A., aged twenty-six, was attacked with "numbness in her right arm, and a diminution of its power. The mouth is drawn slightly to the right side, and there is a feeling of occasional tingling, and sometimes numbness in the left thigh, leg, and foot. This was when she was about two months pregnant. Under careful treatment these symptoms diminished, but she did not lose them until her confinement. Similar symptoms accompanied the next pregnancies. Suffice it to say, that I have now attended this lady in four pregnancies, and with four children, she having borne six; that the same symptoms make their appearance very soon after pregnancy takes place; that they become modified by treatment, but are never removed until after delivery; that the period of their cessation has seemed to depend upon the nature and amount of blood lost during labour, &c. &c."

Case 2.—*Paralysis of Right Arm and Hand.*—M. M., aged thirty-eight, married for nine years, had miscarried on two occasions, and during the eighth month of pregnancy was attacked by a "tingling sensation in the palm of her right hand and fingers, which rapidly ran up the extremity to the shoulder and axilla, when she found herself unable to hold or feel her needle: the fingers were slightly flexed on the hand, the hand on the fore-arm, and the fore-arm on the humerus." Five days after the attack Dr. Lever saw her. "The right extremity was in the condition above described; the sensation of the limb appeared little, if at all deranged; but she complained of a sensation of heat throughout its whole extent; her countenance was pale; there was no pain or heat in the head; her bowels had been freely opened on the day of my visit; her pulse was small, feeble, and 96."† Under the use of sulphate of zinc, with nutritious diet, &c., she improved, but did not recover the use of her arms until after her confinement.

Case 3—*Paraplegia*—"Is that of Eliza H., who was in Guy's Hospital several times (I believe three) under the care of my late colleague, Dr. Ashwell. Immediately after her sixth labour, which was perfectly natural, she felt a great numbness in her lower extremities, as well as weakness, but from them she gradually recovered. During her seventh pregnancy, about the third month, her lower extremities gradually became paralysed, and this time she was unable to stand or walk, and was compelled to keep her bed. After her confinement she was carried into the hospital and placed under Dr. Ashwell's care, when she perfectly recovered. On going out, she became pregnant of her eighth child, and paralysis did not come on until after labour."*

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* Dr. Lever: Guy's Hospital Reports, vol. v. p. 12.

† Ibid., p. 14.

CASE 4.—*Amaurosis.*—Mrs. T., aged thirty-one, soon after quickening of her fifth child, "whilst engaged in some plain needlework, suddenly felt a peculiar sensation in the eyeballs, and found, on opening the lids, that she could merely see the outline of objects, their centre being perfectly dark." "Her eyes were dark; the pupils were large, and contracted (though sluggishly) upon the stimulus of light; the eyeballs seemed to have in a measure lost their mobility, and to be inordinately fixed; the eyelids altogether, or nearly, covered the globes, for if they were not protected, she complained of a sensation of dryness and smarting." This state continued until her confinement; in a week afterwards there was an improvement which increased until after her return from the country: at the end of three or four months she could see as well as ever.†

CASE 5.—*Deafness.*—Mrs. S., aged twenty-three, when about three or four months pregnant of her first child, noticed that her hearing was not so acute as before; and it was evident that, week by week, it was becoming more obtuse. "She was dispirited and pale; her tongue, when protruded, was tremulous, flabby, and indented; her pulse small and feeble; her appetite tolerably good; her bowels regular; her nights restless; and the irritability of her temper had increased." The deafness continued to increase, in spite of treatment, until after her labour, which was natural. "The day after, she said her hearing was better, so that by the time she went to church she could hear as well as ever."‡

CASE 6.—*Hemiplegia.*—Mrs. P., aged eighteen and a half, in the seventh month of her first pregnancy, fainted, in consequence of some family disputes, and when she recovered "it was found that she was hemiplegic, on the right side, as far as the upper part of the abdomen; no pinching, tickling, or any other irritation, caused any movement in the right lower extremity. On the following day she swooned again, and this was followed by an apparent loss of motion and sensation in the right upper extremity. Matters continued the same for three days, when the limbs suddenly regained their usual power. Speechlessness now ensued, which also lasted for three days, and was followed by the loss of power in the right lower extremity as far as the knee." The symptoms improved, but continued until she was delivered. In a subsequent pregnancy she suffered from speechlessness for a fortnight, and after delivery she found she had lost all power of the lower extremities, but this she gradually regained.*

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* Dr. Lever: Guy's Hospital Reports, vol. v. p. 16.

† Ibid., p. 17.

‡ Ibid., p. 18.

CASES 7 and 8.—*Hemiplegia.*—In addition to the preceding cases, which I have condensed from his paper, Dr. Lever, in a letter which I have his permission to publish, writes: "I have since seen two cases of hemiplegia depending upon cerebral disease, in which gestation proceeded to the full time, labour progressed, and the patient recovered. The child of one was hydrocephalic."

CASE 9.—*Facial Paralysis, Partial.*—"I know of one woman who had had two deliveries, and is now pregnant. She counts her pregnancy by finding numbness and want of power on the right side of the face, with the sensation of 'pins and needles' in her right hand. She recovers after delivery."

CASE 10.—"Another lady has had eight children, and has always suffered in a similar way. She had just aborted. Neither of these patients could nurse their infants."

CASE 11.—*Amaurosis.*—"In the course of this year (1853) I was requested to see a lady about thirty years of age, highly sensitive, nearly eight months pregnant, who was suffering from amaurosis in one eye, perfect; in the other, the loss of vision was not so complete. She had had two fits, but not having the opportunity of meeting the medical attendant at my first visit, I did not learn their nature; however, by her appearance and her evidence, I was induced to suspect the presence of albumen in the urine. The medical man applied the usual tests, and found that this was the case; and as the vision became more and more impaired, the operation for the induction of premature labour was resorted to. Labour pains commenced twenty-four hours after the rupture of the bag of the waters, and in twelve hours the child was expelled, still-born. Three weeks since, her husband told me that his wife could play a game of cribbage."

CASES 12 and 13.—*Deafness.*—"In two instances I have known the sense of hearing, sorely blunted during pregnancy, restored after confinement; but albumen was not to be detected after delivery. When the albumen has been found wanting, the acuteness of hearing has returned." Let me add, that Dr. Lever mentions that in every case of this kind in which he examined the urine he found it albuminous.

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* Dr. Lever: Guy's Hospital Reports, vol. v. p. 20.

My friend Sir James Simpson has kindly furnished me with the following notes of cases which have come under his observation:—

Case 14.—*Hemiplegia.*—Mrs. ——, the daughter of a distinguished physician, when nearly eight months pregnant, became slightly amaurotic (palsy of the fifth): this led Sir James to examine the urine, which he found coagulable. Before labour came on, hemiplegia gradually supervened. The patient recovered to a certain extent after her confinement; she is now able to walk about, but has not yet the complete use of the affected side. In a subsequent letter he mentions another case of great interest.

Case 15.—*Facial Paralysis.*—"The lady is within a week or two of her third accouchement. Four days ago, after feeling unwell, she felt a stiffness in the right side of her face, preceded by pain in the back of the head. The stiffness soon assumed all the usual symptoms of paralysis of the portio dura. When I saw her to-day, the face was much disfigured, particularly when smiling; she could not close the right eye, &c.; and, in addition, there appeared a want of sensation about the cheek, nose, and lips, as if the sensitive branches of the fifth were also affected. The eyelids, but especially the right, were swollen and œdematous, but there was no œdema of the hands or feet, or elsewhere. The pulse was very slow and weak. She was super-sensitive to sounds, light, &c.: but the point that will interest you is this, that on testing the urine, I found it become very opaque and thick, on boiling." "I have seen a number of instances of local paralysis, particularly of the eyes, in connexion with albuminuria, but not until the present case, any example of paralysis of the seventh pair."

Case 16.—*Hemiplegia.*—He adds, "Since writing to you, I have seen a patient who became hemiplegic six years ago, with her first child, and who has only imperfectly recovered the use of the affected side. From the symptoms accompanying the attack, it was probably another instance of this result from puerperal albuminuria."

The following cases occurred in the practice of Dr. Crosse of Norwich:—

Case 17.—*Hemiplegia.*—"Mrs. —— was delivered of twins in May, 1844; a feeble, slender woman; had paralysis of the left side of the face before she married, which always remained; also the right became paralysed after her labour, under a reducing diarrhœa, but this was recovered from. In the course of this year (1846) her paralysis of the left side increased; she emaciated greatly; during these unfavourable changes there were sickness and strong indications of pregnancy. In June she had become so feeble as to take to her bedroom, and after some weeks could scarcely get out of her bed to have it adjusted. She passed her water only once in twenty-four hours, and at length had great difficulty in speaking and in swallowing—all signs of increasing paralysis or increasing disease of the brain." "She sunk in powers and bulk as pregnancy advanced; at the end of September could swallow only liquids, and was much troubled with the mucus, which she could neither swallow nor expel by the mouth; very threatening paroxysms of suffocation were produced by this. In the beginning of October she was evidently sinking fast, relieving us from the fear of delivery at full time, which she could not have survived."* She died October 12th, but no *post-mortem* examination was made.

CASE 18.—*Hemiplegia.*—"Mrs. P., aged forty-two, mother of several children, six years ago had a slight paralytic stroke when pregnant, but went on to the full term of utero-gestation and recovered. Complained of numbness of the right leg and arm some days before, and became quite hemiplegic of that side at midnight, September 2nd, 1827. Bleeding, blistering, and opening medicine employed. The liquor amnii began to dribble a few hours afterwards, and she was observed to strain as if in labour now and then, though she said she had no pain. In twenty-four hours a child between six and seven months was born dead, and the placenta followed. Although she strained she did not appear to have the usual severe pain from the action of the uterus, and only called out at the last few pains when the child was passing through the os externum. September 5th. She remains hemiplegic, but in all other respects seems doing well."†

CASE 19.—*Hemiplegia.*—Mrs. B., aged twenty-seven, was seized with hemiplegia a month before delivery, she recovered considerably before labour came on, on the 17th of May. "On the 9th of October she had slowly recovered almost the entire use of the limbs, but is thin, and feeble in mind as well as body." In 1845 she was again confined, without any paralytic symptoms before or after labour.‡

I am indebted to my friend Dr. Beatty for the two following cases:—

CASE 20.—*Facial Paralysis.*—"October 1st, 1850. Mrs. ——, first pregnancy. This young lady expected her confinement about the end of this month, and was very much shocked, on going to dress herself this morning, to find her face crooked; she had no notice of the paralysis that seized the muscles of her face, and her first knowledge of it proceeded from seeing herself distorted in the looking-glass. I was sent for, and found the mouth drawn very much to the left side, and the muscles to the left side flaccid and powerless; the tongue, on being protruded, was turned to the right side; she had some headache, and was very much frightened; pulse 98 and small; leeches were applied behind the right ear, and after free purgation she was quickly brought under the action of mercury. Leeches were several times applied in the same situation, followed by blisters, under which treatment the paralysis of the side of the face gradually diminished, and in less than three weeks it had quite disappeared. She was confined on the 21st of the month. Her labour was easy, of eight hours' duration, and the child, a girl, was born alive and healthy. The urine was not examined. This lady has had two children since, and suffered no deviation from the healthy state in her pregnancy."

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* Cases in Midwifery, &c., by J. J. Crosse, M.D., F.R.S., p. 162.

† Ibid., p. 163.

‡ Ibid., p. 164.

Case 21.—*Hemiplegia.*—"Aug. 8th, 1844. Mrs. ——, first pregnancy. This lady, very young, very small, of a lively, active temperament, was seized with paralysis of the right side of the body, in the middle of the night, just three weeks before her confinement at the full period. The attack commenced with a fit resembling epilepsy or convulsive hysteria. When I saw her the next day she could not speak intelligibly, and had very little power over the right leg and arm. Her face was flushed. She complained much of headache, and was very irritable. Her pulse was 98, small and weak. Leeches were immediately applied to the temples, and the bowels were well freed as soon as possible, a large quantity of dark fæces being expelled. When this was effected, she was rubbed with mercurial ointment, and leeches were again applied to the temples and behind the ears, followed by blisters to the nape of the neck and behind the ears. She was quickly brought under the influence of mercury, and severe salivation ensued. The power over the limbs soon began to return, and were it not for the severity of the action of mercury upon the mouth, she could have spoken. She recovered perfectly in a fortnight, and was able to walk about and use her legs and arms. Her mouth continued very sore until her delivery took place. Her labour was an easy one, lasting only six hours, when a fine healthy girl was born. This lady had no swelling of the limbs nor any other premonitory symptoms of a convulsive attack. The urine was not examined. She has borne three other children since without any unnatural occurrence."

Case 22.—*Partial Paralysis of Right Side.*—My friend Dr. M'Clintock has favoured me with the following case:—"A lady, of healthy constitution but nervous temperament, was suddenly seized with numbness, coldness, and partial loss of power of the right leg and arm, when in the last month of her fourth pregnancy. She was immediately put to bed and the limbs well chafed with spirits. I saw her very soon after the attack, and found her in a state of great alarm and nervousness. Neither pain nor vascular fulness of the head was present; nor had she suffered from any symptom usually regarded as indicative of cerebral congestion. In the course of an hour she lost the unpleasant sensations in the limbs, and completely regained the power of them. The following day her only source of complaint was an unpleasant tingling in the ring and little finger of the right hand, and at times also in the right side of her tongue and lips. In the course of the next three weeks she had occasional returns of these anomalous sensations in the leg, arm, and tongue, but less often in the leg than in the other parts. Once or twice she complained of her forehead and the roof of her mouth being similarly affected. On the 11th of August (1849) she was confined, and had a short and easy labour, and a most favourable convalescence. On the fourth day there was a return of the numbness and coldness, &c., as before, in the right leg, side, and arm. Between this date and the 1st of October, when her child, which she had been nursing, died, seldom more than three or four days passed without a visit from her troublesome complaint. It lasted about an hour, and was generally accompanied by a considerable flow of limpid urine. On more than one occasion I observed that the temperature of the affected limb was lower than that of the other; once, but only once, both legs were affected. Dr. Charles Johnson saw this lady with me on September 13th, and agreed with me in thinking that her symptoms were purely of a nervous kind. Menstruation came on a few weeks after the death of her infant; nevertheless she continued to be tormented with this deranged sensation of the right side of the body. In the middle of December she went by our advice to the country, and returned home again in six weeks, wholly and entirely free from her complaint, after its having persisted for five months under the varying conditions of pregnancy, the puerperal state, lactation, and menstruation.

Case 23.—For permission to publish the following case, I am indebted to Dr. Stokes. It is one of remarkable interest, and I can bear personal testimony to the accuracy with which the report has been drawn up by Mr. Burland:—"Catherine

Commins, aged thirty, room-keeper, 18, John's-lane. Admitted into the Meath Hospital, November 5th, 1856, in the seventh month of pregnancy. A robust, well-developed woman, of sanguineous temperament, and mother of five children. She has always enjoyed uninterrupted good health; her former pregnancies were not marked by any symptom unusual during such periods, and her children are strong and healthy. She states that her husband, previously kind and attentive to her, during the summer of 1856 became very intemperate, and that when intoxicated he frequently abused her, so that before and during the months of her present pregnancy, her constant mental anxiety and depression of spirits were so great as even to prevent her taking sufficient nutriment; that, in the early part of August (she being then in her fourth month), in a drunken fit, he struck her with a heavy shoe, on the left arm and side, and otherwise ill-treated her—the marks of which she bore on her admission to hospital. She did not, however, observe any symptoms of paralysis till Sunday, November 2nd, when, after retiring to bed in apparent good health, she awoke during the night with a pricking sensation and numbness in the left arm, side, and leg (she describes the sensation as her arm and leg being 'asleep'), and complete inability to move either extremity. She continued in this state till Wednesday, when she was conveyed to the hospital, being unable to stand or walk. She then presented the following appearances:—The muscles of the face, tongue, and neck, were altogether intact; her intellect clear; deglutition and articulation perfect. There was complete loss of sensation and motion in the left arm from the shoulder; in the left side (as far as the mesian line posteriorly, but not so definitely marked anteriorly—there being sensation in the right half of the left mamma, whilst the other half was completely insensible) and in the left leg, slight insensibility, but complete loss of voluntary motion. During the entire period of the paralysis there was no muscular atrophy, spasm, rigidity, or contraction, the temperature was somewhat lower in the diseased side, and the legs were slightly œdematous. There was no evidence of organic disease, and the fœtal heart and 'bruit de soufflet' were heard from time to time. The urine was examined on two occasions, and presented no other abnormal condition than the following:—Colour, pale amber yellow; reaction, acid; sp. gr. 1·011; urea diminished; no appreciable deposit; all other secretions normal. She was ordered stimulating lotions and a succession of small blisters to the back of the neck and along the spine, under which treatment, after a lapse of four weeks, sensation partially returned to her leg, and to the arm between the shoulder and elbow, when she was able also to move the limb, but could not stand or walk. She continued to improve till the latter part of December (eighth month), when she gained sufficient power over the limb as to be able to 'hobble,' but not to walk without assistance; her arm and side remained in the same state as on her admission. The urine, on Thursday, January 15th (third day before parturition), presented the following characters, viz.:—Yellow amber colour, turbid, copious pink lateritious deposits of lithates; strongly acid; sp, gr. 1·035; no trace of albumen. She continued in the above state till Saturday night, January 17th, without any parturient sensations—except a few flying pains, which she attributed to indigestion—when on Sunday morning (ten days before the time anticipated), at eleven o'clock A.M., she was seized with 'true labour pains,' and in five minutes was delivered of a small, but vigorous and extremely healthy female child. I removed the 'placenta' in fifteen minutes afterwards, without any hæmorrhage, after which she again experienced the 'pricking sensation' return, with a slight degree of warmth in the elbow. Gradually sensation returned to the arm and side, and shortly afterwards complete power of motion, so that she could raise her arm over her head, and move her leg, as the will dictated."

II. Paralysis during and after Delivery.—Case 24.—*Amaurosis.*—Mrs. ——, aged twenty-six, was seized in labour of her first child, September 9th, 1811, and was soon after attacked with convulsions. The fits were frequent and violent, and continued less frequently after delivery, which was completed by the forceps; she was bled largely; blistered; cold applied to the head, &c.; but she remained insensible forty-eight hours after delivery, after which she gradually recovered. "She was left completely blind for two weeks; she then began to see imperfectly, but was six weeks before she could distinctly discern objects."* In another case of convulsions related by the same author, the sight, especially of one eye, remained for some time imperfect.

Case 25.—*Amaurosis.*—"Mrs. C., first pregnancy; under difficulties and depressed spirits; under thirty years of age; labour began with a convulsion; eyesight and sensibility lost; pupils greatly dilated. I was called in consultation; the os uteri was much dilated; delivery effected by forceps. Bleeding and blistering being fully practised, the convulsion ceased; eyesight, quite lost for several days, at length returned, and there was perfect recovery."*

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* Dewees' Compendious System of Midwifery, p. 505.

Case 26.—*Hemiplegia.*—I am indebted to Dr. M'Clintock for the following:—"This case occurred shortly before my leaving the hospital in the year 1847. E. D., aged thirty-six, was delivered of a healthy boy, her third child, after an easy labour of about four or five hours' duration. Paralysis of the right arm and hand came on in the course of labour, and was wholly unattended by convulsion or any cerebral affection. She recovered the effects of her accouchement most satisfactorily, and could not be prevailed upon to remain in the hospital beyond the eighth day (the usual time for the patients to return home), although she had only partially regained the use of the affected limb. During the seven days she remained under observation the treatment employed was at first warm stimulating fomentations to the arm, and afterwards blistering along the course of the brachial nerves, together with active purgatives. A very marked improvement took place under the use of these means, but the ultimate result of the case I do not know."

Case 27.—*Paraplegia.*†—"In the month of December, 1850, M. J., aged thirty-two, an unmarried servant, was admitted into the Wurzburg Lying-in Hospital. She had previously been twice confined after natural labours, the last time in July, 1848. Eight days after this last confinement, she caught cold as she was washing in water up to her knees. Two hours afterwards she was attacked with symptoms of paralysis of the lower part of the left leg, which in the course of some days extended to the left thigh, and after two or three weeks to the right leg below the knee. At this time also the movements of both the upper extremities were somewhat difficult, yet, though the patient could neither stand nor walk, she could still employ her hands in knitting, sewing, &c. In the month of May, 1850, conception again took place, accompanied by an increase of the palsy, without any diminution of the sensibility of the affected parts in the course of the disease. On the other hand, the deficiency of nutrition in the muscles of the fore-arm and legs was remarkable." Labour set in January 28th, 1851, and after a considerable time she was delivered of a healthy child. She recovered well, and the paralysis seemed to diminish slightly from the fourth to the tenth day. Local bleeding, blistering, electricity, strychnia, and ergot were tried without material benefit, and she remained, a

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[*] Crosse's Cases in Midwifery, &c., p. 155.

[†] Scanzoni: Lehrbuch der Geburtshülfe, p. 1000.

year and a half later, much in the same state as when she left the hospital.

Case 28.—*Paralysis of Right Leg.*—The following case has been published by Dr. Beatty :[*]—"Anne Kieran, aged twenty-one, delivered of her first child, November 26th, 1836, after a labour of seven hours; infant born alive. Nothing remarkable occurred during labour or afterwards until she complained on the second day that she could not move her right leg, and that it felt benumbed and dead. On examining the limb, no swelling or pain could be discovered at any part that could indicate the approach of phlegmasia dolens; on the contrary, the sensibility of the limb appeared considerably lessened. Frictions with warm turpentine were ordered to the limb, but without any effect upon the condition of the part. At the end of a fortnight, finding that no improvement had taken place, a course of blisters along the line of the sciatic nerve was commenced, beginning above and going downwards. This plan, together with attention to her general health, had the effect of gradually restoring the power of the limb. In a month she was able to walk across the ward with the assistance of a stick, but even yet the leg was dragged along with difficulty, and when carried forward, the foot hung loose and vacillating, the toes pointing to the ground. In another month she had regained considerable power over the muscles, her progression was much more firm and steady, and the sensibility of the limb was almost entirely restored. She continued to improve until the month of February, at which time she was walking about nearly well, and preparing to leave the hospital, when puerperal fever made its appearance in our wards." She was attacked by pericarditis, and died in about a week.

Case 29.—*Paralysis of the Left Leg.*[†]—"In the month of February, of the year 1851, a woman, aged thirty-three, applied at the Polyclinique. On the 25th of January she had been delivered of her third child by the forceps, after a heavy labour, which had lasted twelve hours. During parturition she suffered from painful spasms of the left leg, and on the following and subsequent days, after she had left her bed, complained of lassitude, difficulty of walking, and diminished sensibility of the left foot. The examination showed that the sensibility of the left leg and thigh was normal, but that it was deadened on the dorsum and in the sole of the foot, so that the patient could not distinctly feel the hand when passed over it, or the ground when she put down her foot. The diminution of motility was betrayed by a laborious dragging of the leg in walking, and by the difficulty with which she executed all the movements. The veins were varicose, and the uterus had remained prolapsed after delivery. A purgative was ordered, followed by friction with oil of turpentine and the internal exhibition of the spirituous extract of nux vomica, commencing with half a grain and increased to one grain three times a day. The result was so completely satisfactory, that the motility and sensibility were entirely restored, and on March 3rd the patient was discharged cured."

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[*] Second Report of the New Lying-in Hospital: Dublin Journal, First Series, vol. xii. p. 304.

[‡] Romberg on Diseases of the Nervous System, Sydenham Society's edition, vol. ii. p. 390.

CASE 30.—*Hemiplegia.*—For this case I am indebted to Surgeon Forrest. Mrs. H., aged twenty-nine, was confined of her second child on Friday, June 10th, 1853, after a natural labour of about five hours, the second stage being short. Considerable hæmorrhage occurred after delivery, producing fainting, &c., when Mr. Forrest was called in consultation. By means of a compress beneath the binder, and the application of cold, the discharge was controlled, and the patient progressed favourably, with abundance of milk, and the lochia natural, until Tuesday, June 14th, when the lochia ceased without any apparent cause, and without uneasiness of any kind until Friday, June 17th, the eighth day after her confinement, when she was seized with paralysis of the right leg and arm, without headache or any other premonitory symptom. The muscles of the face were unaffected, the sight and speech were perfect, the pupils natural, and the intellect intact. On the following morning, June 18th, she had a severe attack of convulsions, which affected the entire body, and the paralysed extremities as well as the others, after which Mr. Forrest found her in a state of stupor. She had eight fits on this day. On Sunday she continued in a state of stupor, from which, however, she could be roused, and on this day also the convulsions recurred, though rarely, after which they ceased altogether. The pulse was quick, the intellect before and after the convulsive attack was clear, the speech perfect, the eyes natural, the sensibility of the paralysed limbs unaltered, but the motor power entirely lost. After the convulsions she complained of headache, but this gradually ceased, and she recovered by degrees the use of her arm and leg in about two months. No external cause could be discovered for the attack; she had neither anxiety nor shock, was in good health previous to labour, and was neither liable to headache nor hysterical attacks. The hæmorrhage after labour precluded blood-letting, so that the treatment consisted chiefly of counter-irritation by mustard cataplasms, turpentine and assafœtida enemata, four-grain doses of camphor every second hour, purgatives, &c. On Saturday, June 18th, Mr. Forrest had the benefit of Dr. Montgomery's assistance in consultation. The patient is quite well at the present time."

Case 31.—*Hemiplegia.*—The following case, which also occurred after hæmorrhage, is related in a letter from Dr. Ley to Sir Charles Bell.* "Mrs. W. was delivered by a midwife at Kilburn. The labour was easy, but followed by profuse hæmorrhage upon the separation of the placenta from the uterus. She revived from the state of exhaustion immediately consequent upon the loss of blood, but at the end of about three or four days became feverish, and complained of severe headache; for a week, however, she had no other assistance than that of the midwife. At the end of that time (about ten days after delivery), the headache continuing, and being now accompanied with some degree of 'numbness on one side,' I was requested to see her. I found her labouring under severe headache, not confined to, but infinitely more violent upon one side than the other, and occupying the region of the temporal and occipital bones, above the mastoid process, and attended with considerable pulsation. Upon one side of the body there was such defective sensibility, without, however, corresponding diminution of power in the muscles of volition, that she could hold her child on the arm of that side so long as her attention was directed to it; but if surrounding objects withdrew her notice from the state of her arm, the flexors gradually relaxed, and the child was in hazard of falling. The breast, too, upon that side, partook of the insensibility, although the secretion of milk was as copious as in the other. She could see the child sucking and swallowing, but she had no consciousness, from feeling, that the child was so occupied: turgescence of that breast produced no suffering, and she was unconscious of what is termed *the draught* on that side, although that sensation was strongly marked in the other breast. Upon the opposite side of the body there was defective power of motion, without, however, any diminution of sensibility. The arm was incapable of supporting the child; the hand was powerless in its gripe; and the leg was moved with difficulty, and with the ordinary rotatory movement of a paralytic patient; but the power of sensation was so far from being impaired, that she constantly complained of an uncomfortable sense of heat, a painful tingling, and more than the usual degree of uneasiness from pressure, or other modes of slight mechanical violence. Medicinal agents, including bloodletting, general and local blisters, purgatives, &c., directed, first by myself, afterwards by Dr. P. M. Latham, to whose care I directed her in the Middlesex Hospital, were of little avail, and she left the hospital scarcely, if at all benefited. At the end of a few months she again proved pregnant. Her delivery at the full time was easy, and unaccompanied with hæmorrhage or other formidable occurrence; but at the expiration of about ten days she complained of numbness on both sides. The articulation was indistinct; she became more and more insensible, and sunk completely comatose. Upon examination of the body, no positive disorganization of the brain could be detected. The ventricles, however, contained more than the usual serum; and there were found, more especially opposite to the original seat of pain, thickening and increased vascularity of the membranes, with moderately firm adhesions in some parts; in others an apparently gelatinous, transparent, and colourless deposit interposed between them. Such is the outline of a case which I have been in the habit of quoting in my lectures as an illustration of one of the pathological conditions which I have repeatedly observed as a consequence of great and sudden loss of blood, and as a proof that it is a state of local congestion, allied if not amounting to actual inflammation."

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* Bell on the Nerves, Appendix, No. 85.

Case 32.—*Paralysis of Face and Arms.*—Mrs. S., aged forty-three, was confined of her thirteenth child (all of whom are living) in June, 1844. Her labour was perfectly natural, neither preceded, nor accompanied, nor followed by any unusual symptom, until the seventh or eighth day; in the evening of which day, when quietly talking with her husband, she suddenly commenced exclaiming, "conveniency, conveniency, conveniency." Upon attention being directed to her condition, the mouth was observed to be quite drawn to one side, and complete paralysis of one arm existing. The leg of the same side was not affected. She was not nursing; the lochia were quite natural, and the bowels free. When Dr. Duke first saw her, the only additional symptoms he noticed were, a very quick pulse, and some difficulty of articulation. Cold to the head, aperients, and slight mercurialization, were the remedies employed, and they were successful, for she recovered the use of the arm and the power of speech in a fortnight. The quick pulse continued for some months, together with a certain amount of indistinctness of vision, for which she came to town, and I saw her, in consultation with Dr. Jacob and Dr. Duke. We advised counter-irritation, and a tonic treatment, under which she recovered.

Case 33.—*Hemiplegia.*—Mrs. K., aged about thirty-eight years, was delivered of her fifth child, September 15th, after a very easy labour. She was a woman of a very fragile constitution, and can hardly be said to have ever recovered from the inanition caused by incessant vomiting in a former pregnancy. She had not suffered, however, from headache or giddiness, and her stomach and bowels were in pretty good order during this pregnancy: neither had she any œdema or other local complaint. On September 16th and 17th, and up to noon of September 18th, she continued quite well. The lochia were natural, and there was a sufficient secretion of milk. At noon, September 18th, I was sent for, as they thought she did not seem well, and I found her hemiplegic on the left side. She was not, and the nurse believed that she had not been, insensible, and she could speak pretty well, although her mouth was drawn to one side. The motor power of the arm and leg entirely lost, but sensibility not impaired; pulse 120. A few leeches were applied to the temples, and the head was shaved and blistered: the bowels were too irritable to bear mercury. By these means, and a repetition of the blister, and afterwards the insertion of a seton in the arm, she seemed much relieved. She remained perfectly intelligent, spoke well, gradually acquired the power of moving the leg, and, in a less degree, the arm; her face had recovered its natural expression, and ceased to be drawn to one side; the appetite was good, and the bowels regular; the only symptom which made me uneasy was the quick pulse, which never fell below 100. Oct. 2nd. She felt quite well this morning; as the bowels had been confined, she took a pill last night, and when it acted, she got up to the night-chair: whilst sitting there she became very faint, and never afterwards rallied. She died at eight P.M. of the same day, without any increase of paralysis, without coma or stertor; in short, without any new symptom. No *post-mortem* examination could be obtained.

Case 34.—*Facial Paralysis.*—Dr. Ireland has furnished me with the following record of three cases in one family. Mrs. O., aged thirty-four, was confined of her fifth child, November 28th, 1853, and at the end of December was attacked by paralysis of the right side of the face, indistinct vision, ptosis of the right eyelid, &c. Under the influence of leeching, blistering, and mercury she recovered. Her mother had a similar attack after her confinement, which proved fatal; and her sister had suffered from paraplegia for years, which always increased after her confinement, till her death.

Case 35.—*Hemiplegia.*—Mrs. A., aged twenty-six, was confined for the fourth time on Saturday, November 12th, 1853, after a labour of two or three hours, the second stage being under one hour. She had enjoyed excellent health during pregnancy; had no headache or derangement of the stomach or bowels, no œdema, nor was she subject to nervous or hysterical attacks. She was neither plethoric nor anæmic. After her confinement she recovered, without a single drawback, up to the seventh day, November 18th, on which day, at nine A.M., after speaking to the nurse quite composedly, but without making any complaint, she became insensible, with some twitchings of the face, but without any other convulsive movements. The insensibility lasted but a few minutes, but when she recovered she was found hemiplegic on the right side, with some difficulty of speaking. These symptoms gradually diminished, however, and at three P.M., when Dr. Duke requested me to see her, she could move both leg and arm, and grasp my hand firmly, and speak quite intelligibly. She was quite intelligent, but there were some words which she either could not pronounce or could not remember, although she recognised them when mentioned, and assented, nor could she put out her tongue freely. She said that she had no pain in the head or anywhere else; the eyes were clear and bright, the pupils well dilated, and amenable to light, which, however, caused her no annoyance. The pulse was 140, small, thready, and fluttering. There was a slight degree of tenderness in the right iliac region, which disappeared soon after; the lochia were abundant, natural in appearance, and free from unusual odour; and she had plenty of milk. After very minute inquiry, neither Dr. Duke nor I could detect any cause for the attack. Dr. Duke had applied six leeches to the forehead; had given moderate doses of blue pill and opium, which were continued; and had applied sinapisms to the legs, and a blister to the nape of the neck. She continued pretty much in the same state during the day, but in the evening she had another attack of paralysis, accompanied by very slight twitchings of the arm, after which the loss of power was much more complete, although she retained perfect sensibility throughout.

Nov. 19, 10 A.M.—She slept at intervals during the night; pulse 140; small and weak. She can still move the leg a little, but the arm scarcely at all; her speech is thicker, and the difficulty of getting out certain words increased; but she shows that she understands everything that is said. The bowels have been moved, and the bladder emptied; but, from the difficulty of moving, she passes all under her, though not unconsciously. The same remedies continued, the head shaved and blistered, and chicken broth allowed.

Nov. 20, 10 A.M.—In much the same state as yesterday, except that her pulse has increased in strength and volume, and is only 120. She has no pain at all, is quite intelligent; the expression of her face calm and easy; she cannot move the arm, but it is quite sensitive; the leg she moves a little. The bowels were moved, and the urine passed. We had this day the advantage of Dr. Stokes' assistance, and as he concurred in our plan of treatment, the pills of mercury and opium were continued, another blister applied, and a mixture of ammonia, in infusion of orange-peel, ordered.

Nov. 21, 10 A.M.—Dr. Montgomery visited her with us this day; we found the paralytic affection in the same state as yesterday, but she seemed not quite so well, in consequence of having passed a sleepless night, and from the bowels having been acted on too freely by the mercury. Pulse 120, weak, but fuller and more steady than they were two days ago. Neither Dr. Stokes nor Dr. Montgomery was more successful than we had been in detecting the exciting or the pathological cause of the attack. The pills were ordered to be omitted, and a chalk mixture, with a few drops of laudanum, substituted. Another blister was applied to the head.

Nov. 22, 10 A.M.—Our patient seemed better this morning, more lively and intelligent; she can move the leg more, but the arm and hand are quite powerless; the bowels are more quiet, and she takes a little food well. Partly from her inability to use the bed-pan, and partly from her passing both urine and fæces together when she did use it, we had no opportunity of examining the former until to-day. The nurse had always told us that it appeared natural, but this day we procured a quantity which I brought away for analysis. Unfortunately, the cork came out of the bottle, and all was spilled except about half an ounce. This, though insufficient for an accurate quantitative analysis, was enough to show the presence of a large proportion of albumen, with epithelial scales, pus corpuscles, and the urates of ammonia and soda.

Further visits on my part were unnecessary, but Dr. Duke was kind enough to furnish me with specimens of the urine passed in the nights of November 23rd, 25th, 26th; and my intelligent young friend, Dr. Charles Leet, has given me the following careful analysis of each:

No. 1. Nov. 23.—Urine, pale-yellow in colour, faint, peculiar odour, feebly acid reaction. Specific gravity, 1028·500.

Water		934·850
Solid constituents		65·150
Urea	14·591	
Uric acid	1·250	
Fixed salts	11·166	
Albumen	19·225	
Ammonia, salts, and extractive matter	18·918	
Amount in 1000 parts of urine	65·150	

No. 2.—November 24.—Physical characters the same as the last, but with a much smaller sediment. Specific gravity, 1024·250.

Water		943·087
Solid constituents		56·913
Urea	18·340	
Uric acid	1·200	
Fixed salts	9·245	
Albumen	10·928	
Ammonia, salts, and extractive matter	17·200	
Amount in 1000 parts of urine	56·913	

No. 3.—November 26.—This specimen was of a deeper yellow colour, and had a strong reaction. Specific gravity, 1014·500.

Water		969·658
Solid constituents		30·342
Urea	9·250	
Uric acid	1·909	
Fixed salts	6·103	
Albumen	3·833	
Ammonia, salts, and extractive matter	9·250	
Amount in 1000 parts of urine	30·342	

The following Table will afford a comparative view of each specimen with the others and with the average standard in health. As the quantity passed in twenty-four hours could not be ascertained, the normal quantity, 30 oz., has been assumed.

	Normal Average.	Specimen No. 1.	Specimen No. 2.	Specimen No. 3.
Amount of urine in 24 hours . .	30 oz.	30 oz.	30 oz.	30 oz.
Specific gravity .	1019	1028	1024	1014
Solids	570	840	720	420
Urea	218	188	228	121
Albumen . . .	—	155	134	39

Thus we see that the solid matter in No. 1 and No. 2 is far above the average of health; that the quantity of urea is nearly as much below it, except in No. 2, where it is in excess; and there is a large proportion of albumen, although diminishing with each specimen. It may fairly be presumed, I think, that the disproportion of these constituents was even more remarkable at an earlier period of the disease, and for this reason I cannot avoid expressing my regret that I did not bestow more care upon it.

I have said that I did not see the patient after Nov. 22, but Dr. Duke informs me that she continued to improve slowly up to Nov. 25th, after which, for a few days, she seemed not so well: her intelligence was less, and she seldom spoke, but answered by a nod or a shake of the head; she retained the power of moving the leg but not the arm. Nov. 26.—There was barely a trace of albumen in the urine. Nov. 30.—Dr. Duke informed me that our patient is again improving slowly. Dec. 12.—Up to this day the improvement had continued, slowly indeed, but quite marked. Her intelligence was restored, her bodily strength increased, her appetite better; in everything save the impotence of the arm and leg, she was going on most favourably. During the morning she seemed very comfortable, and was talking cheerfully with her sister. At one o'clock she raised herself to a sitting posture in the bed, and took some gruel, feeding herself with her left hand. As she finished, some remark of her sister's excited a fit of hearty laughter, after which she suddenly exclaimed, "Oh dear! oh dear!" fell back insensible, and expired almost immediately.

Post-mortem examination, Dec. 14, two P.M., forty-eight hours after death, by Dr. Duke and myself.—There were the usual marks of the gravitation of the blood, but no sign whatever of any putrefactive change; the body was in good condition, and a layer of fat, an inch thick, was found on cutting through the abdominal integuments. The head was first examined: there was no turgescence of the scalp, nor when the skull was removed was there anything abnormal detected about the dura mater. On removing this covering we found the superficial vessels moderately congested, except at one part of the anterior lobe of the right hemisphere, which was quite pale and bloodless, with a slight effusion of serum beneath the arachnoid. But the most memorable fact noticed at this stage of our examination was, that every bloodvessel contained bubbles of air, alternating with globules of blood, giving to each vessel a beaded appearance, and this extended to very minute vessels, and to those in the division between the hemispheres. We traced the bloodvessels as minutely as we could with the naked eye, but could discover neither obstruction nor obliteration. The brain was then carefully removed; the upper portion of the spinal marrow and the nerves appeared quite healthy; there was no morbid appearance about the base of the brain; the pons varolii and the parts adjacent exhibited neither congestion externally, nor bloody points when cut into, nor any change in the firmness or appearance of their structure; the right hemisphere was healthy throughout, of its usual firmness and appearance, and, when divided, free from vascular points. In the anterior lobe of the left hemisphere, just about the anterior termination of the ventricle, we found the white cerebral substance, and, to a limited extent, the gray matter in the neighbourhood, reduced to a pulpy condition, about the density of gruel; the texture was completely destroyed for about an inch and a half in length by half an inch in breadth; the colour was very little changed, was certainly not redder than usual; posterior to the diseased part the tissue seemed quite natural; there was no hardness nor vascularity; nothing, in short, to mark the transition from diseased to healthy structure. Again, in the posterior lobe, there was a similar, but smaller spot of softening, without surrounding vascularity or hardness. We remarked, indeed, that the bloody points generally seen upon cutting through the substance of the brain were less numerous than usual. Dr. Lyons examined a portion of the softened part, and he found nothing but exudation corpuscles, with the débris of cerebral fibres; neither purulent nor serous infiltration; no other morbid appearance was discovered in the brain or cerebellum, and not above an ounce of serum escaped. The lungs were free from adhesions, and perfectly healthy. The heart was of the usual size, its walls of the ordinary thickness, and its cavities normal and empty; the auriculo-ventricular and aortic valves were complete, perfect, free from vegetations, and of the usual thinness. On opening the abdomen we found no trace of peritonitis; the stomach, the greater portion of the small, and all the large, intestines, were perfectly healthy; in one part of the small intestines we found the coats stained of a reddish brown colour, and the mucous membrane quite soft and pulpy.

The same reddish-brown colour extended to the contents of the pelvis; we found the uterus nearly reduced to its natural size (five weeks after delivery); its walls were of their natural thickness and apparently healthy; the cervix was dark-coloured, and had still a bruised appearance; the cavity contained a thick gelatinous, reddish-brown fluid, of which some had escaped through the vagina on to the bed; it had no putrid odour, but resembled not quite healthy menstrual fluid; the ovaries were small and healthy, but the broad ligaments and fallopian tubes retained an unusually vascular appearance, and in the folds of the ligament was a cyst as large as a grape. The kidneys were dense, and one much larger than the other; when cut into they exhibited great congestion, and from the divided tubes purulent matter escaped. The other viscera were perfectly healthy.

I shall now give a summary of the foregoing cases, and make a few remarks upon the more important points connected with them. With regard to the numerical value of the cases, I should wish it to be understood that I consider the cases far too few to enable us to draw any very decided conclusions, although, as far as they go, the results are worth stating.

Of the 35 cases, in 23 the attack occurred during pregnancy; in 12, either during or after labour.

In 24 cases where it is mentioned, I find that in 10 it was their first child; in 1, the second; in 4, the third; in 2, the fourth; in 3, the fifth; in 2, the sixth; in 1, the thirteenth; and one had several children, but the number is not specified.

Of the 35 cases, there were 18 of complete hemiplegia, and 1 partial; 4 of paraplegia, in 2 of which only one leg was affected; 6 of facial paralysis; 5 of amaurosis; and 3 of deafness; but in some of these local palsies were combined with the cases of hemiplegia. Of 15 cases of hemiplegia, in which the side affected is mentioned, I find that 11 were of the right, and 4 of the left side. Of the 35 cases four died.

It may be well, however, to consider these cases somewhat more closely, and for the purpose they may be divided into two classes, those which occurred during pregnancy, and those which were attacked during or after labour. Of the 23 cases in which paralysis occurred during pregnancy, 13 were examples of hemiplegia; 1 of paraplegia, which had occurred previously; 4 of facial paralysis; 2 of amaurosis; and 3 of deafness. There is no regularity as to the period of gestation at which the seizure took place, for of 14 cases in which this is mentioned, in 1 it occurred in the second month; in 1 in the third or fourth month; in 1 in the fifth; in 1 in the sixth or seventh; in 4 in the seventh; in 2 in the eighth; and in 4 in the ninth month; from which it would seem, upon the whole, that it is in the latter months that pregnant women are most liable to the attack. Of 20 cases, 12 appear to have been cured before or by delivery, and in 8 the disease continued for a longer or shorter time afterwards. Of the 21 cases, only one died, and in this case it is evident that death was rather owing to disease of the brain, of longer standing than the pregnancy, than to the paralysis which increased during the process; so that I do not think we can reckon it as impairing the comparatively innocuous character of these attacks during gestation. In three cases only was the paralysis preceded by convulsions. In most of the cases it does not appear that there were any premonitory symptoms, little or no headache, nor any other circumstance calculated to excite apprehension until the paralysis supervened. The characteristics of the palsy resembled very closely those of similar attacks unconnected with pregnancy: the motor power was enfeebled or altogether lost; in some the sensibility was increased, diminished, or modified; but in others, I infer from the silence of the reporter, that it was little, if at all changed from its natural condition. The intellect seems to have preserved its integrity in all the cases. A peculiarity of great interest in many of these cases, and to which I shall revert by-and-by, is the presence of albumen in the urine, whenever that secretion was carefully examined.

The second class, consisting of 12 cases, is characterized by the attack occurring during or after labour. It is remarkable that in 3 cases only (Cases 24, 25, 26) did the paralysis take place during labour, and of these two were cases of convulsions; in all the others it not merely succeeded labour, but in most cases after an interval sometimes considerable: for example, in Case 24, it took place on the first day after delivery; in Case 28, two days afterwards; in Case 33, three days; in Case 35 seven days; in Cases 27, 30, 32, eight days; in Case 31, ten days; and in Case 34, a month afterwards. Of these 12 cases, 5 were cases of complete hemiplegia; in 1 only the arm was affected; 1 was a case of complete paraplegia; in one the right, and in 1 the left leg only was paralysed; 2 were examples of amaurosis; 1 of facial paralysis; and in 3 only of the cases of hemiplegia the face participated in the attack. In Dr. Ley's very remarkable case, the paralysis of the motor power of one side was accompanied by loss of sensibility on the other. In some of the cases the sensibility was diminished, in others unaltered, but in none increased. The phenomena of the disease were not peculiar: in the majority of the cases the attack occurred generally without warning, and without any obvious cause. In 2 cases convulsions terminated in amaurosis, but in Mr. Forrest's case the paralysis preceded the convulsions, and during the latter, the paralysed limbs shared in the convulsive movements. The duration of the disease varied a good deal, the paralysis gradually subsiding in most cases: in Case 25, after several days; in Case 24, in six weeks; Case 32 recovered the use of the arm in a fortnight, but vision remained imperfect for some months; in Case 35, in a month; in Cases 29, 30, in two months; Case 28 recovered the power of walking in two months, but was then attacked by another disease which proved fatal; Case 27 left the hospital without improvement. In 3 cases death occurred: in Case 33, on the fourteenth day, and in Case 35, on the twenty-fourth day after the paralytic seizure. Dr. Ley does not mention on what day his patient died.

I have already alluded to the fact that in most of the cases the attack occurred without warning, and without apparent *cause.* Some cause there must be, of course, but it is much easier, in most cases, to say what it is not than what it is. For example, in none of these cases except one, did it appear to depend upon any external influence—upon cold, exposure, violence, &c.—or upon mental distress; in few, if any, was there evidence of previous cerebral congestion, or disease of any other organ. It has been suggested that the palsy may be merely the termination of convulsions, and certainly some of these cases would seem to support this view; but if this were generally true, we should find convulsions more frequently preceding the paralysis, and, also, we should meet with more cases of convulsions terminating in paralysis. Now, in all the cases I have quoted, a large majority exhibited no convulsive movements at all, and, on the other hand, of all the cases of convulsions related by Drs. Collins, and M'Clintock and Hardy, there is not a single instance of such a termination; we must therefore refer both convulsions and paralysis to some common or different cause. I have no doubt, as Dr. Romberg has observed, that in a number of cases, especially those which occur during gestation, the palsy is due to a reflex action from some organ or structure in a morbid condition, and in which the nervous system seems to be merely the channel of transmission, offering no central disorganization. In such cases the exciting cause may possibly be some injury or morbid condition of the generative organs, or perhaps merely a transient excitement, such as that of pregnancy. It is possible, also, that some of the instances occurring during gestation ought rather to be classed under the head of hysterical paralysis, as described by Drs. Laycock and Romberg, but it is not always easy to make the distinction.

Obstruction of the arteries has been recently shown by Sir James Simpson* to be an occasional occurrence in childbed, either from arteritis, a coagulum, or a detached vegetation; and a degree of paralysis may be the result; but inasmuch as the death of the limb, and ultimately of the patient, is the direct consequence of such an occurrence, the history of the cases I have quoted removes from them the suspicion of being thus caused.

It may naturally be supposed that the stress and exertions during labour which give rise to such great congestion of the face and head, by also occasioning congestion of the brain, might be considered one of the principal causes; but such a supposition is not borne out by facts, for, excluding the cases of convulsions, in only one case did the paralysis occur at the time of labour; in all the others it either supervened before labour, or subsequently, at a time when all such direct action must have ceased, and in some after such an interval that we cannot suppose it even a remote effect of the parturient agony. On the other hand, when we remember the number of severe labours in which no such attack occurs, or compare its frequency with that of convulsions during labour, we can scarcely attribute much influence to this cause. Again, as we have seen, paraplegia has been attributed to severe and prolonged labour, and to the consequent mechanical pressure upon the nerves and muscles of the pelvis, and at first sight this seems an adequate and feasible explanation, and of which no one could deny the possibility; yet so far as our cases are concerned it can hardly have been so, for in all but one the labour was natural, easy, and not prolonged: in the exceptional case the patient had been delivered by the forceps; moreover, the period at which it occurred was too distant to justify our attributing it to this cause in the other cases. On the other hand, if we recollect the number of severe, prolonged, and instrumental deliveries which take place without any such result, no example being recorded by Drs. Collins, M'Clintock and Hardy, or, with the exceptions I have quoted, in any of the reports of the British and foreign hospitals, so far as I am acquainted with them, I think we must also reject this peculiarity of labour as a necessary or frequent cause.

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* Edin. Monthly Journal, Feb. 1854.

In two cases the attacks seem to have been connected with an anæmic condition, consequent upon hæmorrhage, either from the direct effect of a deficiency of the circulating fluid, or indirectly from the increased susceptibility of the nervous system, under these circumstances, to ordinary exciting causes. In another case paraplegia appeared to result from cold; but in the majority of cases, as I have already observed, there was neither plethora nor anæmia; neither exposure, want, injury, advanced age, mental distress, nor sudden shock; in short, there was no apparent cause.

Unfortunately for the cause of science, there are very few *post-mortem* examinations on record, from which we might decide with some degree of certainty upon the nature of the affection. In all the slighter and more partial cases, life is preserved, and when death occurs in the more severe instances, permission to examine the body cannot always be obtained. Of the four fatal cases I have here detailed, two only were examined: in these, and I doubt not in the other two also, disease of the brain or its membranes existed. In Dr. Ley's case, he states that "No positive disorganization of the brain could be detected. The ventricles, however, contained more than the usual serum; and there was found, more especially opposite to the original seat of pain, thickening and increased vascularity of the membranes, with moderately firm adhesions in some parts; in others an apparently gelatinous, transparent, and colourless deposit, interposed between them." In short, there appears to have been an attack of partial meningitis, and the contrast between the peculiar train of symptoms to which it gave rise, and the absence of all symptoms except the palsy in Dr. Duke's case is very interesting, when we remember the remarkable disorganization we discovered in the latter case. Now in these cases we may fairly assume that the palsy and death itself were the result of the disease of the brain and its membranes, but to what are we to attribute the slighter and more numerous cases? Do they not appear to belong to the class described by Dr. Abercrombie, as "depending upon a cause which is of a temporary nature, and capable of being speedily and entirely removed."

What is this temporary cause, producing so serious a disturbance, and yet scarcely, if at all, endangering life? May it be the one to which Dr. Latham refers as observed "in those convulsions and apoplexies which appear and disappear, the chief circumstance which attracts our attention being albuminous urine?" At any rate it deserves our careful attention. Of the fact of the occurrence of albuminuria with certain affections of the nervous system during pregnancy and childbed, there can be no doubt whatever. Both Dr. Lever and Sir J. Simpson have detected it in cases of convulsions during pregnancy and labour: the former observes:—"I have carefully examined the urine in every case of puerperal convulsions that has since come under my notice, both in the Lying-in Charity of Guy's Hospital, and in private practice, and in every case but one the urine has been found to be albuminous at the time of the convulsions." "I have further investigated the condition of the urine in upwards of fifty women, from whom the secretion has been drawn during labour by the catheter, care being taken that none of the vaginal discharges were mixed with this fluid; and the result has been that in no cases have I detected albumen, except in those in which there have been convulsions, or in which symptoms have presented themselves which are readily recognised as precursors of puerperal fits." Sir James Simpson's observations about the same time, and those of more recent observers, Sabatier, Legroux, Richelot, and others, have confirmed the conclusions of Dr. Lever as to the presence of albumen in the urine in cases of puerperal convulsions, so that no doubt now exists as to the fact, although we occasionally meet cases of convulsions without albuminous urine, and of albuminuria without convulsions.* Now, as paralysis in some cases occurs in connexion with convulsions, if not as consequences of them, we might, not unnaturally, expect albumen in the urine of such patients; and accordingly, in a patient of Dr. Lever's, and in others, we find that it has been detected.

But we may go a step further, and state that in cases where no convulsions have preceded the paralysis, albuminuria has been equally observed. Dr. Lever says of his cases, that in none in which he examined the urine did he ever fail to find albumen, and the great experience of Sir James Simpson is in close accordance with this, as may be seen by the quotations I have given, and by the cases with which he has favoured me. This was observed also in Dr. Duke's case, where the paralysis succeeded the delivery; and in which I think there is ground for believing that the albumen had diminished at the time the urine was first examined. In all probability it would have been detected in many others, had an investigation been made. Thus we find that albuminuria may be a marked symptom in puerperal convulsions, whether terminating in paralysis or not: and in the palsy of pregnant and puerperal women, whether partial or complete, whether local or general: and if the observations are yet too few to draw any very positive conclusions, it is, I believe, because our attention has not been drawn to the subject. And when, in addition, we find, as Dr. Lever states, that as the albumen diminishes the paralysis subsides, we can hardly doubt that there is some important connexion between them.

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* It may be of interest to append Dr. Seyfert's conclusions on this subject:—"1. Albuminuria is not an essential accompaniment of normal, healthy pregnancy. 2. The theory ascribing albuminuria to the pressure of the enlarged uterus on the renal vessels, is inadmissible. 3. When anasarca, from Bright's disease, occurs during pregnancy, the patients are seldom attacked by eclampsia. 4. The albuminuria, in cases of eclampsia, is occasioned by the interruptions of the functions of the respiration and circulation by the attack. 5. In such cases the albuminuria terminates with the attack. 6. Albuminuria is not present in all cases of eclampsia. 7. Albumen is found in large quantities in the urine of epileptics, *immediately after an attack*; but not invariably after every seizure, or in every case of the disease. 8. Provided there be no Bright's disease, this albuminuria among the epileptics ceases soon after the convulsions, and only returns after the next attack."—*Edinburgh Monthly Journal*, Feb. 1854, p. 168.

What then is the precise pathological significance of albuminuria? We may assume as established, that although it occurs in Bright's disease, *it alone is no proof of the presence of that disease;* but in the present state of our knowledge it is very difficult, perhaps impossible, to come to any decided conclusion upon the matter. It is conceivable that an unusual, morbid, or noxious ingredient in the urine may be produced in either of three ways:—1. By simple elimination from the blood in which it was present; 2. As the result of diseased action of the kidneys, excited either by some noxious principle in the blood, or by a morbid condition of the organs; or, 3. As a new compound, the result of chemico-pathological action, which we may or may not be able to explain.

Now, albumen in the urine cannot be placed under the latter category, as it is not a new principle, but one already existing in the blood. Nor does it come under the first, for although it is possible that it might be eliminated from the blood in which it is present, it cannot be as a noxious element, nor would this simple elimination account for the condition of the kidneys or for the concomitant symptoms. So that it would appear this secretion of albumen must be owing to some disordered action of the kidneys, excited by some morbid element, in kind or degree, which they are endeavouring to separate from the blood. This seems at least to be the opinion of a high authority, Dr. George Johnson of London, who, in describing acute desquamative nephritis, in which albumen is so largely secreted, observes, "That all the changes of structure commence in the secreting cells of the gland, and are the results of an effort made by the cells to eliminate from the blood some abnormal products, some materials which do not naturally enter into the composition of the renal secretion."* This view is further confirmed by a *post-mortem* examination into the state of the kidneys themselves in albuminuria. Dr. Handfield Jones, in a recent paper, has described three varieties: "The first is the condition of engorgement, such as is seen in those who die in the early stages of acute anasarca, or in that of dropsy succeeding scarlatina. The organ is enlarged, dripping with blood in every part; its tissue not destroyed, but many of the tubes are seen, under the microscope, to contain coagula of the exuded fibrine, entangling blood globules, and more or less of epithelium." "The second form of diseased renal structure is that of the large, heavy, often mottled and pale kidney. In this there is no hyperæmia, but rather the reverse state usually exists. The cut surface has not the appearance of healthy structure, and gives one the idea of some matter having been implanted among the natural constituents, so as to obscure them and to produce a confused aspect. The tubes are found impacted with epithelial matter, but not by any means constantly obstructed or blocked up, although they may be irregularly dilated," &c. "The third variety of morbid change is that so familiar to observation as the dwindled, granular kidney."†

When we consider the temporary nature of the albuminuria in many of the cases of paralysis, we need have little doubt that the condition of the kidneys answers to the first variety here described, or that of extreme congestion, and this opinion is confirmed by the examination of Case 35, in which we found a high degree of congestion, which had indeed passed into a more advanced stage. I think, therefore, that we may fairly assume that the albuminuria is due to a congested state of the kidneys, and I confess that I cannot but think that the explanation given by Dr. G. Johnson and others, that this congestion is excited by the effort to eliminate some noxious element from the blood, is more in accordance with our present knowledge than any other; yet I must not omit to mention that by some this congestion has been attributed to pressure of the gravid uterus upon the renal vessels. Dr. Seyfert, as we have seen, rejects this mechanical explanation, and seems to attribute the albuminuria to the eclampsia, in consequence of the interruption of the functions of respiration and circulation. But if the former theory be true, what is this morbid element, morbid in kind or degree? It is very difficult to answer this question. Sir James Simpson suggests that it may be an excess of the urea or some morbid quantity or quality of caseine in the blood. Dr. George Johnson's observations seem to prove that in these cases, in addition to a change in the proportion of the normal constituents of the blood, of which the diminution of its albumen is one, there is always an excess of urea. Then, it may be asked, "To what is the effect upon the nervous system owing?" One can conceive that it may result either—1. From the continued presence of the noxious principle in the blood; or, 2. From the balance of the constituents of the blood having been destroyed; or, 3. From the diseased condition of the kidney—though to which of these we ought to attribute it, it would be difficult to decide.

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* Diseases of the Kidney, p. 105.

† Medical Times and Gazette.

But at whatever conclusion we arrive with respect to these interesting points, I am sure all will agree with me, that, taking the circumstances into consideration, it is probable the kidneys play a more important part in these paralytic affections than has been suspected, and that the subject deserves more attention than it has received. For we find that in cases of convulsions terminating in paralysis we may have albuminuria; in paralysis before delivery, without convulsions, we may have albuminuria; in paralysis occurring after delivery, we may have albuminuria; and further, that in the slightest cases, both the convulsions and paralysis diminish with the decrease of the albuminous secretion. Whether therefore the paralysis be caused by the state of the kidneys, or the renal congestion and paralysis be both the result of some morbid matter in the blood circulating through the system, it is clear that a new element may be added to those which have usually been considered as giving rise to paralysis. Nor is this barren theory only, but, if it be true, it has a direct bearing upon practice, inasmuch as our attention ought not to be confined to the secondary affection of the nervous system in such cases, but must be directed to the relief of the renal malady, and to the restoration of the kidneys to such a state of efficiency as may enable them to remove the morbid constituents of the blood; and, for our encouragement, we have seen that a diminution of albumen in the urine is followed by mitigation and cure of the paralysis. For the latter affection, blood-letting, general when the system will bear it, or local by means of leeches or cupping; blisters, purgatives, and mercury, are the remedies usually employed; these must be modified according to the condition of the patient, the circumstances of the attack, and the duration of the disease. When much blood has been lost during labour, blood-letting must be omitted, and we must confine ourselves to counter-irritation; perhaps a series of small blisters to the neck, down the spine or along the limb, will be the best mode of proceeding. The patient's strength must be supported judiciously by good diet, and it is quite possible that some stimulant, such as ammonia or camphor, may be necessary. When the paralysis has become chronic, strychnia or galvanism may be found useful: and I believe Dr. Stokes has found galvanic acupuncturation very beneficial in facial paralysis. The renal disorder should never be treated by diuretics, but by external irritants, such as mustard poultices, or rubefacient liniments to the loins, and internally by diaphoretics, as suggested by Dr. Osborne,* of this city, and when more chronic, by gallic acid, iron, &c.

CHAPTER XXV.

TETANUS.

ALTHOUGH tetanus is a very fatal affection, yet it has been considered so rare an attendant upon childbed that it is scarcely noticed by any writer upon diseases of women. However, Sir James Simpson has collected a sufficient number of cases to prove that it should no longer be overlooked, and I shall therefore give a brief abstract of its peculiarities, for which I am mainly indebted to his excellent paper.†

It was formerly believed that tetanus was more common among females than males, but modern statistics have reversed this opinion, for of 128 cases of traumatic tetanus collected by Mr. Curling, 112 were males and 16 females; and of 221 cases collected by Professor Laurie, of Glasgow, 185 were males and 36 females. Of 1069 fatal cases in the Registrar-General's reports, 829 were males and 240 females; so that the males were nearly 4 to 1 of the females.

Tetanus may occur from injury of the *unimpregnated* uterus, although this is very rare, for Sir James Simpson gives a case in which he removed a large cellular polypus "by slight traction" from the uterus, and on the ninth evening lock-jaw came on, and terminated fatally in about fifty-five hours.

It may also occur *after abortion*, as was held by very ancient authorities; but it is not very peculiar to first pregnancies, or at any period of pregnancy. Of the seven cases collected by Sir

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* On the Nature and Treatment of Dropsies, &c., 1837.

† Ed. Monthly Journal, Feb. 1854, p. 97.

James Simpson, one related by Dr. Tyler,* and one by Mr. B. Dossabhoy,† several had families, and the period at which miscarriage took place varied. Nor was there any regularity in the period which elapsed between the miscarriage and the setting in of tetanus. In one it occurred a few days after; in another on the sixth day; in a third on the seventh; in a fourth on the eighth; in a fifth on the thirteenth day, and in a sixth a fortnight after the miscarriage. In Dr. Moore's case it occurred on the eighth day,‡ in Mr. Dossabhoy's on the sixth day, and in Mr. Annan's on the thirteenth.§ All but one of the patients died; one in 60 hours; one in 70 hours; three on the third day; one on the fourth day; one on the seventh day; Mr. Annan's on the eleventh day; Dr. Moore's on the thirteenth day; Mr. Dossabhoy's case recovered.

In most of the cases there was nothing distinctive about the miscarriage; in some the ovum was not immediately thrown off; and in others there was so much hæmorrhage as to require the plug. In Dr. Tyler's case the placenta which presented was removed. How far the irritation of the persistent ovum, or of the plug, or the removal of the placenta may have had anything to do with the production of tetanus, it is perhaps difficult to say. The plug is used every day without any such effects, but it is possible that in certain states of the nervous system it may not be altogether innocuous. The symptoms of tetanus were in no respect unusual—commencing with a degree of stiffness about the jaws, and they shortly became rigid and the body retroflexed by tetanic spasms.

Sir James Simpson observes that "in surgical pathology inquiries have been instituted, with a view of ascertaining if there was any kind of settled connexion between the existing state of the wound and the occurrence of tetanus, but without much success. Surgeons seem generally agreed upon the fact, that while the tetanic disease very frequently supervenes when the external wound appears in all respects perfectly healthy, in about an equal proportion of other instances it comes on when the wound is unhealthy, inflamed, or sloughing. In some of the preceding examples of obstetrical tetanus supervening after miscarriage, the lesion or wound left on the inside of the uterus by the abortion, seems to have been 'in a healthy state,' as far as could be ascertained; in others it was so far unhealthy as to have been a source of morbid sanguineous oozing and hæmorrhage. In none of the examples of obstetrical tetanus included in this or the next division, does there appear to have been any tendency to inflammation of the uterus."*

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* Dublin Journal, vol. iii. p. 360, New Series.

† British and For. Med.-Chir. Rev., July, 1856, p. 270.

‡ Dublin Journal, Feb. 1856, p. 225.

§ Edin. Monthly Journal, Nov. 1856.

As an illustration of the disease, I shall quote one of the cases given by Sir James Simpson. "CASE 8.—Mrs. ——, the mother of several children, had a miscarriage at the third month. A slight degree of hæmorrhage followed. On the eighth day after the abortion this discharge suddenly ceased, and a feeling of stiffness soon after supervened in the masseter muscles. Next day the jaws were quite locked, and the head was bent backwards with tetanic spasms, the muscles of the jaw and neck being fixed and rigid. The eyeballs were also sunk and the eyelids partially closed. The patient, however, was able to speak, but the deglutition of fluids was impossible. The pulse was 72; the bowels constipated and flatulent; and the urinary secretion natural. There was no discharge from the uterus, and no uneasiness or pain in that region. The pulse betimes became weaker, and the tetanic paroxysms more and more severe and frequent; and she sank and died in about twenty hours after the appearance of the first symptoms of tetanus. The body was examined by Mr. Crossken and Dr. Fleming about thirty-six hours after death, and as the morbid appearances were in some respects peculiar, I will state them in Mr. Crossken's own words. 'The uterus was about the ordinary size. Its substance and internal lining membrane were emphysematous throughout, full of air vessels and crepitating under the fingers. In fact, it was like a piece of lung, and resembled it also by floating in water. There was, however,' he adds, 'no appearance whatever of decomposition.' "† Dr. Tyler's case is as follows—he was sent for to see a poor woman in the fourth month of pregnancy who had alarming hæmorrhage: "On examination the os uteri was found dilated to the size of a crown-piece, with the placenta attached centrally over it, the hæmorrhage profuse and increasing with every pain. The placenta was extracted and an attempt made to hook down the fœtus with the finger, which failed. A slight draining continuing, a plug was then introduced, which checked it; ergot of rye was administered, without however producing any good results. On the second day the plug was removed, and with it a portion of placenta which had been left; the os uteri was found, on examination, to be now nearly closed. On the fourth day she complained of pain in her back, but not of such a character as to attract particular attention. Six days after this, her only complaint being weakness, she was ordered light nourishment, chicken broth, &c. No particular change occurred till the thirteenth day, when she first complained of her throat, and of inability to open her mouth; she could only swallow fluids, and even those with difficulty. An examination being instituted, the os uteri was found perfectly contracted and impervious; she had experienced severe pain in the back all night, with occasional spasms of the facial muscles. On the following day the jaws were completely locked, and the body bent backwards in a state of opisthotonos; death finally put an end to her sufferings on the sixteenth day."*

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* Edin. Monthly Journal, Feb. 1854, p. 105.

† Ibid., p. 104.

The following case has been recorded by Mr. Blackshaw, of Stockport:†—"On Saturday, Nov. 8th, 1864, I was called to see Mrs. H., aged forty-eight, the mother of a numerous family, of a highly nervous temperament, and whose general health had previously suffered from some domestic anxieties. She was in bed, very faint from profuse hæmorrhage from the uterus. I made an examination and detected an ovum of about ten weeks' growth within the os uteri. In consequence of the amount of the hæmorrhage, I plugged the vagina; ordered cold applications, stimulants, and the usual astringent remedies, including ergot of rye; and she rallied in the course of the following day. The plug remained in the vagina twelve or fifteen hours, and when removed was not again resorted to, as the hæmorrhage had almost ceased, and the ovum was expelled in a few hours afterwards. She progressed satisfactorily for about nine days, at the end of which time she was able to sit up, and about to leave her room." "On the day following, just ten days from my first visit, I was unexpectedly requested to see her. She thought she had taken cold, and was then complaining of great stiffness of the deep-seated muscles of the neck and throat, with difficulty of swallowing, and was unable to open her mouth perfectly. As there was some febrile excitement, she was ordered to remain in bed and to take a saline mixture with an aperient; to use hot fomentations, and afterwards hot moist bran; to steam the fauces, and, if possible, to use a gargle. On the two following days, the painful tension of the masseters, as well as the muscles of the neck and throat, had so greatly increased as to prevent deglutition, and bring on a state of perfect trismus. On Thursday afternoon and evening the tetanic seizures became increasingly frequent, producing great muscular rigidity, contortion of features, and slight opisthotonos. During the paroxysm the pulse was small and feeble, but the consciousness was entire throughout. She continued in this state until Saturday evening, the tetanic spasms and opisthotonos gradually becoming more severe, when she died from exhaustion five days from the first setting in of the tetanic symptoms."

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* Dublin Journal, vol. iii. p. 360, New Series.

† British Med. Journal, Sept. 9, 1864, p. 252.

Lastly, tetanus may occur after parturition, and Sir James Simpson has collected eighteen such cases, to which we may add 232 cases by Mr. Waring and some others. It is not more frequent after the first confinement than after subsequent ones; but as to the period of the attack, Sir James Simpson observes that it seems to be governed "by the same laws as regulate the occurrence of the disease after abortion or after surgical operations and injuries. Under all of these conditions the tetanic attack usually does not commence till about a week after the occurrence of the exciting obstetrical or surgical lesion. According to some statistics published by Romberg,* in more than a half of all the instances of surgical tetanus—or in 112 out of 200 cases—collected by him, the attacks set in between the third and tenth days after the receipt of the injury or the occurrence of the operation."† Of Sir James Simpson's cases it is mentioned that in one it occurred soon after delivery, in one on the second day, in one on the third, in one on the fourth, in four on the fifth, in one on the sixth, in one on the seventh, in two on the fourteenth, in one on the seventeenth day, in one after three or four weeks, and in one after seven weeks. In Dr. Woodhouse's case it occurred on the eleventh day.‡ Of Mr. Waring's 232 cases seven were attacked the first day, thirty-two the second, twenty-nine the third, twenty-three the fourth, twenty-two the fifth, thirty-two the sixth, fifteen the seventh, fourteen the eighth, fifteen the ninth, fourteen the tenth, two the eleventh, nine the twelfth, four the thirteenth, one the fourteenth, one the seventeenth, one the eighteenth;§ in Dr. Paterson's case it occurred on the fourteenth day.||

In a case, published whilst these pages are passing through the press, by Mr. Henry Viant, the tetanus followed about a week after a natural labour, without any special cause, beginning with trismus, and going on to tetanic convulsions with opisthotonos, every two or three minutes. She died on the fourth day.¶

I find also in "Account of the Deaths in Bombay," published by order of Government, that tetanus occurred after delivery in one hundred and two cases: ten on the first day, fifteen on the second, seven on the third, eleven on the fourth, nine on the

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* On Nervous Diseases, vol. ii. p. 105.

† Edin. Monthly Journal, Feb. 1854, p. 105.

‡ Association Journal, Feb. 9, 1855.

§ British and Foreign Med.-Chir. Rev., Oct. 1856, from Indian Annals.

|| Glasgow Med. Journal, Oct. 1856, p. 274.

¶ Med. Times and Gazette, Feb. 10, 1866, p. 158.

fifth, eleven on the sixth, eleven on the seventh, seven on the eighth, two on the ninth, four on the tenth, two on the eleventh, three on the twelfth, three on the fifteenth, and one on the sixteenth day.

The duration of the disease exhibits greater uniformity; in one case it proved fatal in fifteen hours, in two on the second day, in two on the third, in one on the fourth, in one on the fifth, in one on the sixth, and in one on the seventh day. Dr. Woodhouse's case lived two days, and Dr. Paterson's ten days. Five cases of recovery are recorded—*i.e.*, if we take the whole number of twenty-six cases of puerperal tetanus, four of every five died.

SYMPTOMS.—There was nothing peculiar in the character of the tetanic symptoms, except that early in the attack it may be mistaken for a species of sore throat, and our attention diverted from the prompt treatment of a very severe affection. The following case by Dr. Storrer, of Boston, U.S.,* will afford a good illustration of the disease. "Mrs. C——, aged twenty-eight, and the mother of two children, was delivered at the full time of an infant that weighed eight pounds. The umbilical cord broke off near its origin in endeavouring to extract the placenta. After some unsuccessful attempts to detach the after-birth, it was considered proper to desist from further efforts. The attendant hæmorrhage was slight. During the five following days the pulse remained good and the patient free from fever or uterine pain. Towards the commencement of the sixth a fragment of placenta was removed from the vagina, and, after the use of ergot, two other placental masses were expelled, decomposing and offensive in smell. On the seventh day the pulse was, for the first time, above 100, small and wiry, and the patient complained of pain in the head, considerable stiffness of the jaws, and difficulty in swallowing. The symptoms rapidly increased during the day, and at night the tip of the tongue could scarcely be protruded between the teeth. The muscles of the neck and jaws had also become much more painful; the respiration was laborious; and at irregular intervals tetanic spasms were present. Next day (the eighth after the birth of the child) the muscles of the face were so rigid that the jaws could not be separated in the slightest degree. The merest touch seemed to distress the patient, and to hurry on spasmodic attacks, which occurred every few minutes. The head was retroverted on the pillow; and so firmly contracted were the muscles of the neck, that when the hand was placed behind her occiput, the whole body was brought forward, the neck not being flexed in the slightest degree. When the spasms were present, the patient's sufferings appeared to be extreme. The paroxysms increased in frequency until about midnight of the eighth day after parturition, when she sunk, exhausted by opisthotonos. Throughout there was not any symptom of uterine or peritoneal inflammation."

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* American Journ. of Med. Sciences, Jan. 1842, p. 97.

Causes.—It is difficult to enumerate with precision the exciting causes of this terrible disease, but I may notice that in the cases related there seems reason to attribute some to cold and others to injuries; in one there was hæmorrhage, in which the plug was used, in another the placenta was retained until putrid. In a case related by Mr. Finucane it followed the operation of turning, and in a case of Prof. Dubois, the Cæsarian section. Dr. Paterson's case followed natural labour, and the convalescence was perfect. It seems more frequent in hot climates than in cold; but Sir James Simpson has shown that in these countries the season of the year has little or nothing to do with its production. Thus Mr. Waring has published an account of the disease occurring in puerperal women at Bombay, from which it appears that in three years, ending December, 1853, no less than 232 women died from it, and the number appears increasing. The mortality is somewhat greater during the wet season.

Cold, injuries, operations, and perhaps the presence of putrifying matter in the uterus, appear to be therefore the principal exciting causes. As to the pathological character of the disease, Sir James Simpson attributes it to the lesion of the internal surface of the uterus, which he considers analogous in its operation to the external wounds producing tetanus, and the reason why it does not more frequently cause it, may be from the uterus being almost entirely supplied with nerves from the sympathetic system; but further, "the disease, when developed, essentially consists of an exalted or superexcited state of the reflex spinal system, or of some segment or portion of that system. What circumstances in midwifery or surgery might possibly, whether singly or in combination, produce this state, and so produce traumatic tetanus?" Sir James Simpson suggests that perhaps some morbid condition of the blood, or some centric irritation or morbid condition of the spinal cord, or some irritation propagated along the nerves, from the seat of the injury or wound to the central portions of the nervous system, may afford an explanation of its production, and may constitute the essential condition of the disease; and perhaps the various investigations now carrying on may throw some light on this obscure disease.

Treatment.—For the general treatment of this disease I must refer my reader to the various standard surgical authorities. Local remedies are out of the question in these cases, and as to constitutional treatment, the most important means, as Sir James Simpson judiciously observes, are, "1. The greatest possible quietude and isolation of the patient from all irritation, corporeal and mental, during the course and for some time after the disease. 2. The special avoidance of painful and generally impracticable attempts at opening the mouth in order to swallow; but sustaining the strength of the patient and allaying thirst by enemata, or by fluids applied to the general surface of the body. 3. If there be any well-grounded hope of irritating matters lodged in the bowels acting as an exciting or aggravating cause, to sweep out the intestinal canal at the commencement of the disease with an appropriate enema. 4. To relax the tonic spasms of the affected muscles and diminish the exalted reflex excitability of the spinal system, by sedatives and antispasmodics, with the prospect of either directly subduing this morbid reflex excitability, or of warding off the immediate dangers of the disease, and allowing the case to pass on from an acute and dangerous attack to a sub-acute and far more hopeful and tractable form of the malady."

Of the cases whose recovery is recorded, I find that in one extensive bleeding was adopted, with musk and valerian; in a second blistering and warm baths; in a third bleeding and warm baths; in a fourth turpentine injections, and in a fifth cold immersion.

The sedatives which have been most used are, opium by the mouth, and tobacco enemata; to which may be added belladonna, stramonium, hemlock, henbane, musk, camphor, Indian hemp, hydrocyanic acid, valerian, &c., as having been by different authors strongly recommended. It cannot be said, however, that the evidence in their favour is very conclusive, and I confess that I should hope more from the use of chloroform or ether than from any of them. "Chloroform," Sir James Simpson observes, "in sufficient doses acts as a direct sedative upon the reflex nervous system, and upon exalted muscular contractility. In consequence of this action, it affords one of our surest and most manageable means of allaying common convulsive attacks; and it has now also, according to the reports in periodical medical literature, been repeatedly successful in the treatment of traumatic tetanus,* whilst it has apparently also repeatedly failed in subduing the more acute forms of the disease. Perhaps some of the failures have arisen from the patient not being kept sufficiently deeply and continuously under the action of the drug. If used in tetanus its action will require to be sustained for many hours, or oftener perhaps for many days. And there is sufficient proof of the safety with which its continuous action may be kept up under proper care and watching."*

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* See, for example, Dr. Ranking's Abstract, vol. ix. p. 239 (three successful cases). Brit. and For. Med.-Chir. Rev., 1851, p. 464 (two successful cases), &c. &c.

The following case will best illustrate the treatment by chloroform: it is related by Professor Laurie of Glasgow:—

Mrs. B——, a fine young woman, aged twenty-four years, in the third month after her third pregnancy, miscarried on January 4th, 1854. She lost a considerable quantity of blood and required plugging, cold and pressure, but was so well on Sunday the 8th that I ceased my attendance. On Thursday the 12th she complained of stiffness about the lower jaw, but not suspecting the nature of her illness, she did not send for me till late on Saturday the 14th. I found tenesmus well marked, the spasm not extending beyond the neck, and the pulse nearly natural. Every attempt to swallow gave great pain, and produced a spasm in the muscles of the neck and larynx, which threatened instant suffocation. I forbade all attempts at swallowing, ordered nutritive enemata with 50 or 100 drops of laudanum every six hours, and pectra to the neck, with aconite and chloroform. There was little change till the night of Monday the 16th, when the pulse had risen to 120, and the spasms had greatly increased, but had hardly extended beyond the neck; deglutition was impossible. I immediately exhibited chloroform, which acted admirably, and gave instant relief. I taught her husband and mother how to use it, and she has since been more or less constantly and nearly continuously under its influence. Thursday, the 18th, the pulse was 96, and she swallowed with comparative ease. To-day, Friday, the 20th, she is not quite so well, the pulse is 108, the abdominal muscles rather tense, and the rectum will not retain the enemata. For this last occurrence I was, of course, prepared, and since the 15th she has been carefully rubbed with oil, butter, and cream. She still swallows tolerably well." "One symptom I have forgotten, which is often one the most distressing—a constant cough from accumulated mucus, which cannot be raised or got rid of. In two days it has disappeared. I now anticipate recovery."

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* As some of my readers may wish to refer to the original records, I add the references to those cases which Sir James Simpson has quoted from authors. Velpeau on Puerperal Convulsions, p. 232. Dr. Aubinais, of Nantes, Rev. Méd.-Chir., vol. v. p. 149. Art. Tetanus, Dict. des Sciences Méd. Dr. Colles: Dub. Journal, No. 30, p. 288. Dr. Christie: Ed. Med. and Surg. Journal, vol. viii. p. 415. Mr. Dickenson: Lond. Med. Repos., vol. i. p. 192. Mr. Finucane: Lancet, June 2, 1838. Dubois: Lancet, Feb. 29, 1840. Moulder: Wacher's Diss. de Articulis exterp., 1810. Merriman: Synopsis, p. 339. Dr. Symonds: Art. Tetanus, Cyclop. of Pract. Med. Dr. Currie: Mem. of Med. Soc. of London, vol. iii.

CHAPTER XXVI.

SUDDEN DEATH.

I do not know whether, strictly speaking, I ought to include among complex labours that appalling occurrence which many, perhaps most men of much experience, have witnessed at least once in their lives, of a patient whose delivery has been natural, and whose condition such as to excite no alarm, suddenly, and without apparent cause, dying. A more fearful accident can hardly be conceived, aggravated as it is by the contrast of a few hours before, and by the wholly unexpected nature of the event.

But though such cases do occur, and are now and then registered in the journals, comparatively little attention has been bestowed upon the subject until of late. Dr. Ramsbotham, sen., published a paper on the subject, which was afterwards incorporated in his Practical Observations;* and the subject is noticed by Mr. Travers† and Dr. Meigs.‡ Very lately, Dr. Cormack§ has written upon the subject; and more recently it has occupied the attention of the French Academy of Medicine. But by far the most complete investigation is in an essay by my friend Dr. M'Clintock,‖ who has very kindly given me permission to make free use of the cases he has collected and published therein.

At present it is quite impossible to give a complete and satisfactory history of the subject; probably the best plan I can adopt is to lay the cases before the reader, classifying them, so far as I am able, with such practical deductions and suggestions as they may warrant. In this I do but follow Dr. M'Clintock's arrangement, adding a few cases from my own experience, and some from various sources which may have escaped him.

I. *Syncope.*—It appears beyond question that many of these cases are examples of fatal syncope, though we are not able to trace its cause in each case. For example, Dr. Merriman relates the following instance:—"An accoucheur was once attending a young woman in labour of her first child. Soon after it commenced, and during his absence, she fainted, without any obvious cause. On his return the circumstance was mentioned, but as by this time she appeared perfectly recovered, no further notice was taken of it, and she was safely delivered without any unusual symptoms. On the third day after delivery she took a dose of aperient medicine, and while in the act of relieving herself, fell back and immediately expired."

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* Page 116, 2nd Ed. † Inquiry into Constitutional Irritation, p. 48.
‡ Woman, and her Diseases, p. 577.
§ London Journal of Medicine, vol. ii. p. 941.
‖ Med. Press, Dublin, March 10 and May 5, 1852.

One of the three cases mentioned by Dr. Denman certainly comes under this head. He relates it as follows: "Another raised herself in bed to take nourishment about half an hour after delivery. She fell back and died immediately. She was opened by the celebrated Dr. Jenner. There was no effusion of blood in the brain or in any other part; but the heart was found flaccid, perhaps somewhat enlarged, and not a drop of blood in either auricles or ventricles."* The second case was that of "a woman in labour who was put to bed, and made an effort to change her situation; she died instantly in the act of moving, but she had previously complained of a piercing pain in her head and loss of sight." Another was in such a situation that the child was expected to be born the next pain; she threw herself back and died instantly. The two last cases are the only ones I have found in which death took place before delivery. I do not think they died of apoplexy, but whether of fainting or asphyxia I cannot decide.

The account given by the Rev. Dr. Buchanan of the death of his wife, is a very graphic picture of fatal syncope occurring about the fourteenth day, and is the more interesting as the description of a non-medical person.† Sir James Simpson mentioned a case to the Edinburgh Obstetrical Society, which appears to me to come under this division. "A patient, attended by one of the pupils of the hospital, rose up and stood for the first time, about a week after delivery. She immediately fainted and expired."‡ The Nashville Journal of Medicine and Surgery§ gives two cases of collapse after parturition, which proved fatal, related by C. R. Winston, M.D., of Nashville, Tennessee.

Of a similar kind appear the cases related by MM. Robert, Danyau, &c. In M. Robert's case the patient, aged twenty-five, who was much excited by political occurrences, was delivered of her third child. All went on well until the ninth day, when being assisted from her bed, she suddenly sank down and expired.‖ M. Robert has met with two other cases: one was a primipara, the other had borne several children, and both died on the sixteenth day. A *post-mortem* examination threw no light upon either of these three cases. M. Danyau mentions that MM. Dubois, Moreau, Baudelocque, and himself, had each seen similar cases. In his case the labour was easy and the recovery excellent; he visited her on the twentieth day, and found her agitated and perplexed; in a short time afterwards she passed into an adjoining chamber, and there died. At the autopsy no air was found in the veins or heart; the only pathological change worthy of note was a vascularity of the pericardium, and slight effusion into its cavity.

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* Introduction to Midwifery, p. 427.

† Memoirs of Rev. Dr. Buchanan, p. 378.

‡ Ed. Monthly Journal, 1849, p. 767.

§ L'Union Médicale, 10 Jan., 1852.

‖ Feb. 1851.

Dr. Chisholm has related a case of arm presentation, in which he turned and delivered with no more difficulty or hæmorrhage than usual, on January 12th, 1854. She went on well until the 19th, when he was suddenly sent for, and found her dead. "The account given by her friends was, that while sitting up in bed, after having taken her breakfast as usual, she was seized with a pain in her back which made her scream out: shortly afterwards, she fell back fainting; and having made a very imperfect rally from this, soon fainted again and expired." A *post-mortem* examination threw no light upon the cause of death. There were no signs of asphyxia in the lungs, and no traces of disease anywhere; but the heart was rather softer and paler than usual, and uncontracted, with clots in all its cavities.*

Early in the year 1852, I was requested by a medical friend to see with him a patient who had miscarried a few hours before, with very little pain and no hæmorrhage. On visiting her half an hour previously he had found her fainting, without any ascertainable cause. Although we were not five minutes on our way, she was dead before we arrived. No *post-mortem* examination could be obtained, and yet I think that we cannot hesitate to regard this as another example of fatal syncope, and not death from organic disease, for up to the previous day she had been in perfect health. Some time ago, I attended a lady in a miscarriage, who had not more than the usual amount of loss, after which she felt very faint, but recovered. She went on quite well for several days, when suddenly one evening I was sent for, as she thought herself dying. I found that she had become very faint, without any apparent cause, and notwithstanding every means that we could try she gradually sank, and died in a few hours, with no other symptom than faintness. She had suffered a good deal from morning sickness, but otherwise had been a stout healthy woman. I was refused permission to make an examination. Although the death in this case was less sudden, I can only suppose it to have occurred from syncope.

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* Edin. Monthly Journal, Sept. 1854, p. 348.

But what is the condition which gives rise to this fatal syncope? We know little or nothing. It does not depend upon hæmorrhage, nor the shock of labour, nor fear; for the distance of time from the labour, in many cases, shows that from such effects, if they existed, the patient must have recovered. They appear, in fact, to be cases of cardiac paralysis. Unfortunately, in most of the cases the unexpected suddenness of the event deprives us of the opportunity of treatment; but knowing the possibility of such an accident, may put us on our guard, and lead us to be very cautious in permitting the patient to sit up or to make exertion if she be unusually delicate, or if anything in the labour or convalescence excite our fears.

II. Another cause of sudden death is what has been called "*idiopathic asphyxia*," which Dr. Christison observes, "causes death almost instantaneously, or in a few minutes, or sometimes not for an hour and a half. The symptoms are those of fainting merely, and the only appearance in the dead body is flaccidity of the heart, with an unusual or total want of blood in its cavities."

M. Chevallier, who was, I believe, the first to describe this form of sudden death, gives us an example of it: the case of a woman who died shortly after having been delivered of twins. "After the birth of the second child she appeared a good deal exhausted, and as the discharge of blood was very moderate, the accoucheur thought it best to defer the extraction of the placenta. She recovered a little, but about two hours afterwards grew suddenly faint, breathed short, and died in about half an hour." "All the viscera were free from disease. The uterus contained the placenta, with a small quantity of blood; but all the cavities of the heart were in a state of relaxation, and completely destitute of blood. There was no blood in the vena cava near the heart, and the emptiness of its ascending branch extended as low as the iliac veins."* He quotes also a similar case from Morgagni,† in which the patient died before the expulsion of the placenta, and the heart was flaccid and nearly empty. Without attempting to explain the production of such a disease, and attributing it to some loss of power, first in the minute vessels, and afterwards in the larger ones, and the heart, M. Chevallier contents himself with recommending the horizontal position, the employment of stimulants, brisk friction, warmth, in some cases a hot bath, stimulating enemata, &c.

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* Medico-Chir. Trans., vol. i. p. 160.

† Epistola xlviii., Art. 44.

I am at a loss whether to place Dr. Ramsbotham's cases (43, 44, 45)* under this head or the former. The fatal attack took place soon after delivery, without hæmorrhage or any apparent cause, but the death was not so sudden as in the former class—in one case about two hours after delivery, in another about three, and in a third two days after. That eminent author thus graphically describes the symptoms:—"Shortly after the birth of the child, and the removal of the placenta, when the woman has previously appeared to be doing well, she complains of unusual faintness; says she is extremely ill; at the same time she is unable to describe what is the matter with her. If inquiry be made into the state of the uterus, that viscus is found to be tolerably well contracted; if inquiry be also made as to the quantity of blood escaping externally, that is not unusually large. The woman complains of no pain about the belly; there is no mark of derangement; notwithstanding, she presently gets worse; the pulse begins to flag; the countenance assumes a pallid, cadaverous aspect; she becomes extremely restless, and ceases to express her feelings except by a moan. By-and-by she is seized with a violent pain, or rather stricture, across the chest, and soon ceases to breathe, to the astonishment and grief of all around her."†

Dr. M'Clintock mentions two cases related to him by Mr. Barker, of this city. "In each of these cases, death took place quite suddenly and unexpectedly, not many days after delivery." "As may be supposed, Mr. B. submitted the bodies of these women to a very extensive and close scrutiny; but he failed in discovering anything to account for death, except an unusual flaccidity of the heart, with complete absence of blood in its cavities. We may fairly conclude with him, therefore, that dissolution was the result of idiopathic asphyxia, or of some cognate syncopal affection."‡ Professor Beatty has recorded a case of a healthy woman, aged forty, in the ninth month of pregnancy, who complained of weakness and sick stomach, and immediately afterwards fell back dead. He examined the body most carefully, and the appearances led to the conclusion that the cause of death was idiopathic asphyxia.

But what relation does this idiopathic asphyxia bear to the former cause of death—I mean fatal syncope? Are they essentially different, or merely varieties of the same condition? Dr. Samuel Wright seems to regard them as pretty much the same, both consisting of a sudden paralysis of the heart.* The *post-mortem* appearances mentioned by M. Chevallier are nearly identical with those given by others of mortal syncope, and the symptoms only differ in the rapidity of their course. It is possible, that in the one case the paralysis may commence in, or be limited to, the heart, and in the other to the lungs, but it is very difficult to speak decidedly on the subject. And certainly, as Dr. M'Clintock observes, "if we look upon the idiopathic asphyxia of M. Chevallier as nothing more than a variety or form of syncope, the liability of its invading a woman in childbed becomes still more apparent, from the state in which her constitution is left by the act of parturition; a state of which the prominent characteristics are, an unusual proclivity to diseased action, an excitable condition of the vascular, and a morbid sensibility of the nervous, system. The shock of labour is not recovered from for many days, and during this period (the length of which necessarily varies under different circumstances) the *vis vitæ* is minus; hence any impression of a severe kind, whether affecting mind or body, is not met by the same vital resistance as at other times."† But the difference in degree, the more gradual progress towards death, is an advantage so far, that it gives time for the employment of remedies, and Dr. Ramsbotham observes, that when the patient has been kept up, and after-pains have recurred, she has recovered. The occurrence of the after-pains, I take it, are rather an effect than a cause of the improvement.

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* Pract. Observations, 2nd Ed., p. 117.

† Ibid., p. 118.

‡ Med. Press, March 10, 1852, p. 146.

Prompt administration of stimulants, aspersion with cold water, a current of air, warmth to the feet, perhaps galvanism, and especial attention to the uterus, so as to prevent any loss of blood, are the chief means at our command, and which ought to be continued in as long as there is the least hope.

III. The *shock to the nervous system* of a prolonged and severe labour may sometimes prove fatal, without hæmorrhage or organic injury, and this especially when the mind has been anxious or depressed previously. Mr. Travers observes, that "pain, when amounting to a certain degree of intensity and duration, is of itself destructive. Difficult and protracted parturition is every now and then fatal from this cause; and even in cases in which neither extraordinary difficulty nor protraction was experienced, a fatal prostration has sometimes supervened, which has admitted of no other explanation. The delivery has been complete, without any degree of physical injury, and not more than an ordinary quantity of blood has escaped from the vessels of the uterus; yet the woman, in spite of the encouragement derived from the consciousness of safety to herself and infant, and of comfort from the conclusion that her sufferings were at an end, has never rallied, either in strength or spirits, but after an interval not exceeding a few hours, passed in a low and sinking state, has unexpectedly, and with little perceptible alteration, expired."* He relates two instances of this kind, one of which is as follows: "A young lady, happily married, impressed, probably, by some unexpectedly fatal occurrence in the circle of her friends, entertained, from the commencement of her pregnancy, a morbid fear of death in childbirth, which, although unwarranted by any indication, became, from its continuance and increasing strength, a source of anxiety to one of her immediate and confidential relatives. She was attended by a skilful and experienced accoucheur, who was also her relation. He assured me that the labour was in all respects easy and safe, and that not a single unfavourable circumstance attended it. The child was still-born and imperfect. The mother died suddenly, six hours after delivery. Every region of the body was examined with care by an eminent anatomist, and presented the appearance of health."

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* Path. Researches on Death from Suffocation and from Syncope, &c., p. 14.

† Med. Press, March 10, 1852, p. 146.

One or two remarks appear to me to be called for in qualification of the above statement. 1. That the pain of a severe and protracted labour will occasionally produce such serious results I firmly believe, for I have known it, but I also believe that it must be the pain of the second stage, either unusually severe, unusually prolonged, or unusually effective, owing to some peculiarity of constitution of the patient. I do not believe that such a termination occurs from a prolonged first stage, when the second stage is short. 2. We must not attach too much importance to the fear of dying in childbed, although it is calculated to be injurious, as a depressing cause; for we every day meet with patients who do well, notwithstanding the most decided conviction that they shall die. It probably requires, in addition, some peculiar bodily condition for it to produce its mischievous effects. 3. I think it might be suggested, with some show of probability, that the case quoted from Mr. Travers belongs rather to one of the former classes.

Dr. M'Clintock quotes a case in which there was certainly some hæmorrhage, but in which the death appears to have been more owing to the exhaustion and shock of the labour. It occurred in the practice of Dr. Cuppaidge of Castlerea, who states, "In the beginning of last month, I was sent for one morning, at ten A.M., to see Mrs. C., a farmer's wife, who was the mother of five children, and of rather delicate constitution. Her last labour had been very tedious, and was terminated by instrumental assistance (the forceps, I believe). On my arrival, I learned that she had been in strong labour for three days and nights. She seemed much exhausted, and was perspiring freely, with a feeble, rapid pulse. The pains were frequent and violent, and the fœtal head was pretty low in the pelvis. After waiting some time, and seeing the child made no advance, I applied the forceps, and extracted it with ease, but not in time to save its life. The placenta came away in a very few minutes, and I put on the binder tightly. In about a quarter of an hour, observing her to yawn and appear restless, I examined if there was any discharge, and put my hand over the uterus. It felt rather relaxed, and on making pressure it contracted, expelling a small quantity of blood. By this she seemed improved, but in about twenty minutes began again to sigh and yawn, and toss her arms about, which made me grasp the uterus more forcibly, whereby a few coagula were dislodged. Symptoms of prostration, with extreme restlessness, dejection of countenance, and rapid, intermitting pulse, now began to develop themselves; and though I gave her abundance of burnt whisky, the only stimulant procurable, she continued to sink, and expired an hour and a half from the time of delivery."* There can be no question here, I think, but that the fatal result was attributable to the exhaustion and shock of labour, although, under such circumstances, very slight loss of blood has a powerful effect.

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* Inquiry, p. 48.

I remember a case which occurred at the Western Lying-in Hospital, and which taught me a lesson. A patient had been long in labour, and was showing signs of constitutional suffering, but as the pains were good, and the head was descending, though slowly, it was determined, in consultation, to wait for two hours. Within that time the woman delivered herself, but the shock and exhaustion were so great, that she never rallied, but sank in a few hours without another symptom. Perhaps I may be allowed to mention another case, which occurred in my own practice, as an illustration of the violent shock sustained, though the case does not fairly belong to this chapter, as the patient did not die. The wife of an officer was delivered very rapidly of twins, and immediately after, the double placenta was expelled without hæmorrhage, and all seemed well. But within half an hour she complained of being weak, her pulse became quicker and feeble, and she exhibited all the symptoms of collapse. The uterus relaxed, and on pressure a clot was expelled, but the entire loss was not much more than in an ordinary labour. I had the advantage of Dr. Johnson's valuable assistance, but it was two hours before the collapse yielded to our efforts, and she then rallied. No doubt, in this case the loss had some effect, but that was owing to the depressing effects of the shock of sudden delivery upon a delicate nervous woman, without which I am sure it would have been harmless. There can be little difficulty in distinguishing this class of cases from the others of which I have spoken: the history, the length and difficulty of the second stage of labour, the operation, &c., will generally be sufficient, even were the symptoms more alike; but there is no *sudden* fainting, nor is the aspect of the patient that of one fainting, but rather that of one sinking gradually, but more or less rapidly, and with a severe shock to the nervous system.

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* Medical Press, March 10, 1852, p. 147.

The treatment which seems to have the best effect is the union of an anodyne with stimulants. Wine and brandy must be given, liberally at first, until some degree of reaction is obtained, and then the quantity may be diminished, and chicken broth gradually substituted. Meantime a mixture should be added, consisting of camphor mixture ℥vj., carbonate of ammonia ʒij., and laudanum gtt. lx., of which the patient may take a tablespoonful every one, two, or three hours. The most perfect quiet should be observed, the room should be darkened, and the patient allowed to sleep as long as she can.

IV. The *absorption of air by the uterine sinuses* was suggested by the younger Legallois in 1829, and by Ollivier in 1833,* as being possibly the cause of some, at least, of the sudden deaths after delivery. The elder Legallois had found, in some of his experiments, that sudden death resulted from air penetrating to the vena cava from the uterine veins. Of the possibility of this occurrence one cannot doubt, and the researches of Dr. Rose Cormack† have very much elucidated this subject; his experiments and subsequent observations justify, I think, the conclusions given by Dr. M'Clintock—viz., that the admission of air into the current of the blood is capable of destroying life suddenly; that it is highly probable that air may find an entrance into the vascular system through the uterine vessels; and that in certain cases of sudden death after delivery, the only cause which could be detected was the presence of air bubbles in the heart and vena cava. Dr. Rose Cormack has collected seven cases in support of this view; in six, the presence of air in the veins was demonstrated, and none exhibited any other morbid lesion sufficient to account for death. He observes, "If a large quantity of air have entered the circulation, unequivocal evidence of this will be found by listening to the heart, when the churning sound will be heard. If death does not almost at once close the scene, the phenomena of asphyxia will set in, their rapidity and violence depending upon the quantity of air which has entered, on its passing up to the heart in one large volume, or in divided quantities, on the presence or absence of hæmorrhage, and on the strength of the patient."*

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* Dict. de Méd. Art. Air.

† London Journal of Med., vol. ii. p. 941.

There is a case related by Dr. Ramsbotham which resembles death from this cause, but unfortunately the veins and heart were not examined. The woman had been delivered of a dead child, which was followed by the expulsion of a quantity of offensive gas. The placenta had to be withdrawn, and then the uterus contracted, and the woman appeared well between two and three o'clock. Between five and six she died quite suddenly. Nothing appeared, on *post-mortem* examination, to account for her death.†

Another case has been recorded by Mr. Berry, more recently.‡ A woman, aged twenty-two, was delivered of her first child, after a natural labour, at seven P.M., June 17th, 1850. The placenta came away in twenty minutes, unattended by any immoderate loss of blood. At half-past eight she expressed herself as comfortable, and at eleven took some gruel. At one o'clock in the same night her husband, who lay in the same room with her, became alarmed by the patient's difficult breathing and feeling of faintness, and immediately sent for her medical attendant, but before his arrival at two o'clock, she was dead. On examination, the abdominal organs, including the uterus, were healthy, with the exception of a granular condition of the kidneys. The mouths of the uterine vessels were patulous; the lungs were congested, and contained tubercles; the heart was enlarged and distended, and, upon making an incision into it, a gush of air escaped, and it became flaccid. No blood was found in its cavities. About an ounce of serum was found in the pericardium. The brain was quite healthy, and there were no signs of decomposition in any part of the body.

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* London Journal of Med., vol. ii. p. 950.

† Pract. Obs. in Midwifery, p. 122.

‡ Prov. Med. and Surg. Journal, Nov. 27, 1850.

Mr. G. May, jun., has published three cases. In the first, death occurred on the rupture of the membranes before delivery. After death there was nothing to account for it but distension of the heart by air. The second died six hours after delivery, and the third on the eighth day. Nothing adequate to account for death was discovered except air in the heart and large vessels.*

Dr. Dalton, jun.† relates a case following the perforation of the membranes by a catheter.

"The mechanism," says Dr. M'Clintock, "by which the introduction of air into the veins can be effected, admits of being explained in a few words. The veins of the gravid womb present four remarkable characteristics—viz., their extraordinarily large size, their freedom of inosculation, the total absence of valves, and their termination on the internal surface of the uterus, at the site of the placenta, by large open orifices. If the uterus be examined soon after delivery at the full term, the majority of these apertures will readily admit a goose-quill, and some will even allow the little finger to penetrate without laceration. During contraction of the uterus all the openings are hermetically closed, but when it is relaxed, they again become proportionally more or less patulous. From this it is manifest that the same condition of the organ which causes flooding is exactly that which is indispensable for the ingress of air; so that the latter, when it does take place, is almost of necessity preceded or accompanied by hæmorrhage.‡

But the question then arises, How comes air into the uterine cavity? It may penetrate, doubtless, during the process of expulsion of the child, or during the interval before the expulsion of the placenta, or it may be the result of decomposition, as in Dr. Ramsbotham's case. That air is expelled from the uterus occasionally, during or immediately after labour, we know. Dr. Meigs has noticed it a great many times; Dr. Rose Cormack has also observed it; Dr. M'Clintock witnessed it in four different cases; I have repeatedly noticed it; and it is mentioned by other writers. So that we may conclude, with Dr. Cormack, "I have not only no difficulty in believing, but am constrained to admit, that should any impediment be offered in such cases to the free exit of air by the os uteri, it must be forced into the uterine veins, were their mouths not protected by coagula; and thence it would rapidly pass, by the current of the circulation, up the vena cava, into the right auricle."§

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* British Med. Journal, June 6, 1857.

† Amer. Med. Monthly, June, 1860.

‡ Medical Press, March 10, 1852, p. 147.

§ London Journal of Medicine, vol. ii. p. 941.

In other cases, the process would seem more obvious, as, for example, in the following:—

"M. Depaul mentioned, at the meeting on the 4th instant, of the Surgical Society of Paris, a case wherein it would appear that the introduction of air into the veins of the uterus caused almost instantaneous death. The patient was a rickety woman, about twenty-two, who twice before had been delivered by cephalotripsy, on account of narrowness of the pelvis. On her third gestation, she had a premature delivery; and when pregnant for the fourth time, M. Depaul resolved to bring on labour at seven months and a half. Douches were administered on two several occasions, without any distinct results; and used for the third time, with the usual instrument. The latter is composed of a cylinder and piston, connected with two elastic tubes, one of which is placed in a pail, to which the instrument is fixed; and the other, much longer, ends in a canula of india-rubber. Nothing particular happened at first, except a few pains; four or five minutes afterwards a peculiar noise was heard, showing that air was escaping, although the instrument acted well. The douching was continued, when a gurgling noise was heard in the vagina, and the patient complained of very severe pains. She was, however, pacified, and the operation proceeded with. For the third time air escaped through the tube with the water, and another gurgling noise was heard in the vagina. The canula was now withdrawn, and M. Depaul desired the patient to rise and walk about the room; but when she tried to get up, she turned pale and fell. The pulse at the wrist was gone; and the heart had ceased beating. Efforts were made to revive her, but to no purpose: she was quite dead. M. Depaul, hoping then to extract a living child, proceeded at once to the Cæsarean operation. The uterus, instead of being of a reddish-brown, was of a pale pink; and when the knife had divided a portion of the thickness of the walls of the womb, a sanguineous froth appeared instead of the usual gush of dark blood. In proceeding with the incision, bubbles of air escaped, which must have been between the membranes and the inner surface of the uterus, as the former had not as yet been divided. The child, on being extracted, was apparently dead; but by insufflation from mouth to mouth, it at last breathed, and lived for fifteen hours."*

The intensity of the symptoms probably depends partly on the quantity of air and partly on the condition of the patient. Death may occur suddenly, or, life being prolonged, the patient may die of asphyxia at a later period. The character of the symptoms in the severer cases being similar to those in the cases of fatal syncope or of idiopathic asphyxia, renders the diagnosis between the three during life almost, if not quite, impossible: it is only by the detection of the presence of air in the heart or great vessels after death, that we can positively assure ourselves of that having been the cause of death.

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* The Lancet, July 21, 1861, p. 64.

As to the *treatment* of these cases, Dr. Rose Cormack observes, "In the most rapid class of cases in which death is suddenly threatened from paralysis of the heart from over-distension, we must first strive to relieve the heart from that condition; when the phenomena are chiefly those of asphyxia from more gradually increasing obstruction in the lungs, the various means for treating asphyxia must be resorted to, and among these, in many cases, I believe the alternate use of hot and cold douches will be found to be very valuable, especially if combined with stimulants, judiciously varied, and skilfully administered, externally and internally. In many instances, repose, dashing cold water in the face, keeping the surface warm, and time, may be the only means which ought to be used."*

V. The *formation of a fibrinous coagulum* in the heart was first pointed out by Dr. Meigs as a possible cause of death. He says, "It is well known that the coagulability of the blood is greater in proportion as any hæmorrhage progresses; therefore a woman who has lost during her labour forty or eighty ounces of blood, has the rest of it more coagulable than it was before the flooding commenced. Again, fainting consists in the too little intensity of the presence of blood in the brain; and a woman just gone through a flooding, experiences a sensation of faintness from lessened vascular distension of the encephalon. If she suddenly assume an erect position, the tension becomes instantly lessened in consequence of the gravitation of the blood. But (and this is the danger) if she faint badly while her blood is become thin and highly coagulable from hæmorrhage, the scarcely moving current partially stops in the heart, and when she comes out of the deliquium, if ever, she does so with a coagulum in the auricle and ventricle; she has got a false polypus in the cavities, and will surely die."† In another place he observes, "I beg you to consider briefly the effects to be produced by a mass of fibrinous remainder of a clot suddenly found within, and moulded by, the cavity or cavities of the heart. Inasmuch as the venous blood can only get back to the arterial side by passing through the pulmonic heart, such a clot, if of large size, must either wholly or very greatly hinder the return of the venous blood. In fact, it would be equal to a partial ligation of the cava superior or inferior. Death is likely to follow the occurrence, either immediately or within a few hours. I have observed it to occur within eighteen hours, in thirty-six hours, in eighteen days."* In one case he mentions, the symptoms were sudden sinking, mental anxiety, rapid pulse, and effusion into the pleuræ. A *post-mortem* justified his diagnosis.

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* London Journal of Medicine, vol. ii. p. 938.

† Obstetrics, the Science of the Art, p. 308.

A case in which the cause of death was considered to have been a clot in the heart, is related by Dr. Keith. He attended the patient of twins, November, 1850; the labour was tedious, and she was kept under the influence of chloroform for thirteen hours. The first child was delivered by the forceps; the second came footling. When the placentæ were expelled, there was a great rush of hæmorrhage, which was arrested by the contraction of the uterus. The patient fainted, but gradually recovered; slept, and on awaking, showed no unusual symptom. From this time to the fifth day she went on pretty well, considering the previous history. The lochia were natural, and there was some milk in the breasts. "During this whole period, however, there was an unusual degree of restlessness, and an undefined feeling of discomfort, for which, though frequently asked, she could give no definite cause. The pulse was also faster than usual, and very small." "On the morning of the fifth day, the nurse told me that she had spent a good night; and her own principal request was, that she might have a partridge for dinner. On feeling the pulse, however, it was much more rapid than on the preceding day, and very feeble." "I left at ten o'clock, and at twelve an urgent message was sent to my house. As I was out at the moment, Dr. Duncan was sent for, and at half-past twelve he found her pulseless, and evidently sinking. I saw her half an hour later; she seemed then to have very slightly revived, after taking a large quantity of champagne and brandy. The pulse was, however, quite gone at the wrist, the heart's action extremely rapid and feeble, the breathing very laborious." She died at three o'clock. On examination, an effusion of serum and a thin layer of lymph were found in the peritoneal cavity; the uterus was healthy; the right side of the heart was unusually distended, "and on opening it the right auricle was found quite filled with a large mass of fibrine, quite colourless, and especially at one part, where it adhered to the wall of the auricle, of a firm and leathery consistency."* It is a little difficult in this case to disentangle the effects of the latent peritonitis from those of the clot in the heart. I have seen more than one case of fatal peritonitis of which there were no characteristic symptoms during life, the main anxiety being caused by the quick pulse; but I think in the present case there appear to have been symptoms resembling asphyxia, which can hardly be said to be referrible to the peritonitis.

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* Woman, and her Diseases, p. 577.

The only practical inference from such cases is, the care necessary not merely to arrest hæmorrhage, but to guard the patient against its consequences. The horizontal position, with the head as low, if not lower than the body; the use of stimulants and nutriment, judiciously administered; the equable warmth of the body after the hæmorrhage has ceased; and above all, great caution, for several days, about sitting up in bed, or removing to the sofa, and making any exertion, are all available means for the prevention of this accident which ought never to be neglected.

VI. *Disease of the Heart.*—For more than one reason, we might naturally fear for the result of delivery when there exists organic disease of the heart. The disturbance of the circulation, and the impediment to the free course of the blood which valvular disease offers, even in moments of tranquillity, must be many times increased during the turmoil of labour, with its repeated arrests of respiration and recurring congestion. If under ordinary circumstances the impediment gives rise to effusion, much more may such a result be expected during labour; and an effusion into the cavity of the arachnoid, pleura, or peritoneum may be very serious. Again, after delivery, the volume of blood previously required for the fœtal nutrition, and circulating in the uterus, will be thrown into the general circulation, adding to the existing embarrassment of injured valves, or a diseased heart, unless, indeed, there be considerable discharge—which in turn, however, if excessive, may equally, though for an opposite reason, be a source of trouble.

At a meeting of the Edinburgh Obstetrical Society,† "Dr. M'Cowan stated that on the 16th of June, 1845, he was requested to visit Anne Barker, aged twenty-one, said to be in labour of her first child. On his arrival, he found her suffering from spurious pains, and complaining much of difficulty of breathing, and pain in the left sub-mammary region. The face was very œdematous, as also the lower extremities. Under the usual treatment the pains subsided. During the two following days she complained occasionally. On the 19th she had much pain in the side; respiration laborious; pulse, which had hitherto been about 70 or 80, rose to 120, but feeble. Venesection to ten ounces produced faintness without alleviating the pain. She was then cupped to four ounces with immediate relief. About three A.M. of the 20th, labour commenced, and proceeded naturally and speedily till nine A.M., when she was delivered of a still-born male child, and instantly expired.

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* Ed. Monthly Journal, Jan. 1852.

† Ibid., May, 1849, p. 766.

"*Post-mortem.*—The body presented a generally œdematous appearance. On opening the thorax, the pericardium was found distended with a dark fluid. The heart was much enlarged, extending about two inches to the right of the sternum; right ventricle very thin and dilated. The aortic opening could with difficulty admit the point of the little finger; its valve was hard and cartilaginous. The whole heart was filled with coagulated blood. The surfaces of the pleuræ were strongly adherent; the greater part of the left lung was hepatized. The uterus and other organs seemed healthy."

At the same meeting Sir James Simpson mentioned that he had seen a similar case of sudden death some years before, and which, from the history of the patient, he attributed to disease of the heart.

Dr. M'Clintock mentions, that on two occasions he has seen a patient almost die under his hands, immediately after delivery, from this cause; and he mentions another lady who died suddenly on the tenth or twelfth-day, and who was known to labour under organic disease of the heart. He relates also another case, furnished to him by Dr. Fitzpatrick, in which death took place on the fifth day, and which seems, at least in a great measure, attributable to the same cause.

A case of sudden death, on the day after delivery, has been related by Mr. Young,* in which no abnormal appearance was detected, except hypertrophy of the heart and disease of the aortic valves. Mr. Young attributes her death to this and to the distended state of the stomach, and large size of the liver arresting the functions of the heart.

Now there is no difficulty in such cases in detecting organic disease; and if the accoucheur do ascertain the fact, is he justified in remaining passive? I think not. If, as these cases show, the original embarrassment of the circulation may be increased to a fatal degree by continued labour, why allow it to go on? We cannot prevent labour, but surely we can shorten it; and if ever there is a case in which the use of the forceps is justifiable merely to shorten labour, this is certainly one. I am happy to have the authority of Sir James Simpson to confirm this opinion, and still more happy to be able to quote a successful case so treated. In the summer of 1851, my friend, Dr. Stokes, asked me to take charge of a patient who had been admitted into the Meath Hospital, with extensive valvular disease of the heart, disturbed circulation, dyspnœa, and œdema. She was in the eighth month of pregnancy at that time; and before the end of the ninth month, under Dr. Stokes's judicious treatment, the œdema had subsided, the circulation become tranquillized, and the respiration easy, unless she were agitated or exerted herself. Fearing the effect of labour upon her diseased heart, I determined to shorten it as much as possible. I arrived at the hospital about half an hour after the commencement of labour; fortunately the os uteri had rapidly yielded, and I found the head in the pelvis. I immediately applied the forceps, and delivered her in about five minutes of a living child. The placenta was expelled immediately. When I applied the forceps she was beginning to show signs of distress in respiration, and more than usual congestion; but after delivery this instantly subsided, and she recovered speedily and well from the labour.

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* Association Journal, Nov. 19, 1853.

VII. *Obstruction and rupture of the pulmonary arteries.*—We are indebted to the researches of Mr. Paget for a knowledge of the effects of obstruction in these vessels; and in his second paper he suggests that many of the cases of sudden death for which no apparent cause has been found, may have been owing to clots obstructing the pulmonary arteries, and that the cause of this coagulation is some change in the composition of the blood.

The first case of the kind recorded, I believe, is the following, by Mr. Havers.* A delicate lady, aged thirty-four, was delivered of her second child, after a natural and easy labour. The removal of the after-birth was attended with some little difficulty, and was followed by a gush of blood so sudden and violent as to place her life in imminent danger. This took place on the 18th of August, and she progressed favourably till the morning of the 23rd, when her attendant "found her restless, her countenance sallow, her eye unusually bright and wandering, and her manner catching and irritable. She said she had passed a bad night, which she referred to the fulness of her breasts producing a feeling of palpitation and distress at the pit of the stomach. Her tongue was slightly coated, and her pulse as usual, quick and weak." These symptoms subsided under an alterative dose, and matters went on well until the morning of the 30th. "She had been on the sofa and easy-chair each day, was in good spirits, and apparently in good health. On that day she was better than usual; she made her lunch at an early hour, and told her nurse that she was so well that she would dress herself without assistance; while in the act of dressing she fell on the bed; the nurse observed some frothing at the mouth, and slight convulsion of the face. She spoke feebly once, then laid herself back and died." Mr. Paget was present at the *post-mortem* examination. "With the exception of the cicatrix of an old abscess in the apex of the right lung, and the heart, to be just now referred to, the organs were generally healthy. The muscular structure of the heart was pale and thin, especially that of the right ventricle, which contained some dark blood. Each of the pulmonary arteries contained a clot of blood nearly filling the calibre of the vessels. The chief clots were about an inch and a quarter in length, mottled and firm, and in some instances slightly adherent to the sides of the vessel. In tracing the divisions of the artery, numerous other clots were found, of the same character as the larger ones, and extended even into the smaller ramifications of the arteries." Mr. Paget was of opinion that these clots existed two days before the death of the patient.

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* Med. Times and Gazette, Feb. 14, 1852.

An additional example has recently been afforded in an illustrious exile. The Duchesse de Nemours recovered very well after her confinement, and on the fourteenth day, whilst her maid was dressing her hair, she suddenly exclaimed, "I feel ill," and died. A *post-mortem* examination showed that death was owing to a clot in the pulmonary artery.

And still more recently Dr. Mackinder has related two cases. "In the first, the patient was thirty-two years of age, and had been delivered of her second child after a natural and easy labour. Seventeen days afterwards, while apparently in good health, she rose up convulsively, said she was choking, and died. On subsequently examining the body, a large, branching, fibrinous plug was found completely stopping up the right pulmonary artery, and its immediate ramifications, while the entrance to the left pulmonary artery gave lodgement to a large and tolerably firm concretion. The heart was rather thin, and the lungs slightly congested, but there was no further trace of disease about the body." In the second case, the patient had an easy labour, and for a few days afterwards all appeared to progress favourably, when she imprudently left her bed-room and exposed herself to cold. Shortly afterwards she was seized with difficulty of breathing, gasping, and cold clammy sweats, from which death relieved her in twenty minutes."* Unfortunately, a *post-mortem* examination could not be obtained. How far these obstructions may be the result of simple coagulation, or in part, at least, owing to what Virchow has termed "embolism," is difficult to say until our information is more complete.

A very interesting case of rupture of the right pulmonary artery during labour, followed by instant death, has been published by Dr. Crooke.† The labour was going on slowly, but well, and on the occurrence of a powerful expulsive pain, the patient's face became livid, and she complained that "her heart was leaving her," and died in a few minutes. On *post-mortem* examination all the viscera were healthy; there was fluid blood and coagula in the cavity of the chest, which was found to have escaped from a rupture of the right pulmonary artery.

Of course, it will require more observations before we can arrive at any very positive conclusions; it does not seem improbable, however, that such clots, which would more readily form after hæmorrhage, might occasion asphyxia and death. In the present state of our knowledge of the subject, I fear we can deduce no further practical instruction than the necessity of arresting hæmorrhage as speedily as possible, and keeping the patient in an horizontal position until the blood has so far recovered as to lose its disposition to coagulation.

VIII. *General dropsy.*—When ascites and anasarca occur to a considerable extent during pregnancy, the patient may die immediately after delivery, without any very obvious cause, but apparently from asphyxia, as the following case will show: Mrs. ——, aged thirty-eight, was in the sixth month of her fourth pregnancy when she suddenly became dropsical: the hands, arms, body, and lower extremities were swollen; there was much fluid in the peritoneal cavity, for she was larger than if at the full term. The pulse was 120, and the respiration sometimes difficult, and always hurried. Labour came on unexpectedly in the country, and I did not see her till it was over. The child was dead; the placenta had to be extracted, and though there had been some hæmorrhage, she had not the aspect of a person sinking from that cause. When I saw her, her lips were blue, her aspect pale but not pallid, the surface warm, the respiration hurried, and the pulse 100, and weak. She had spoken after delivery, but could not answer my questions, though she seemed to understand me. She had no convulsions, nor any head symptoms. She gradually sank in spite of our utmost efforts, and died about three hours after delivery. No *post-mortem* was permitted. What was the immediate cause of death? Not hæmorrhage, nor an affection of the head—not fainting, certainly. There may, for aught I can tell, have been a clot in the heart, but I came to the conclusion that it was asphyxia, from effusion into the lungs.

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* Med. Times and Gazette, July 23, 1859, p. 96.

† Medical Press, Sept. 17, 1853, p. 193.

IX. *Minute perforation of the intestine.*—I saw a case of this kind a short time ago, which might have been mistaken for one belonging to some of the former classes, had there not been a *post-mortem* examination. Mrs. C——, aged thirty, was confined of her first child after a natural labour, and recovered well up to the sixth day, except that she had no milk. On the sixth day she had an attack of weed, without abdominal pain, from which she recovered as usual, after twenty-four hours. On the tenth day she had a rigor, with diarrhœa, and some griping pain, from which she was soon relieved. On the twelfth day the rigor returned, with abdominal uneasiness and slight tenderness, a pulse of 110, no thirst, some diarrhœa, the lochia natural. At this time I saw her; and leeches having been applied, calomel and opium given, I merely suggested a full opiate at bedtime. The next day she was much better; pulse 84, neither pain nor tenderness of the abdomen, no rigor, and the bowels quiet. The day after I did not see her, as she told her medical attendant in the morning that she felt quite well. On his visit the next morning (the fifteenth day after delivery), he found her in a state of the most complete collapse, pulseless, voiceless, and bathed in a cold, clammy sweat. She rallied a little under the use of stimulants, but died in the evening. At the *post-mortem* examination we found no peritonitis, and the uterus was perfectly healthy; but the termination of the ilium and commencement of the colon were much inflamed, and on raising this part of the intestine a quantity of fluid fæcal matter escaped from a minute perforation, and we found more of it in the pelvis. In this case the cause of death was evident—collapse after perforation; but the extreme minuteness of the perforation, and the rapidity with which death took place, were very remarkable.

Scarlatina.—The first of the following cases may fairly be considered one of sudden death, and I believe it is the only one of the kind recorded. I have added the second as illustrative, although the patient recovered.

Case I.—Dec. 14th, 1858, sent for to Mrs. S., and received the following history:—A delicate lady, suffering a good deal during pregnancy, taken in labour of her fifth child Dec. 13th, and was delivered early in the morning, after an easy labour of a few hours. Placenta came away naturally; no hæmorrhage; pulse quiet and good. During the day she went on quite well; lochia natural. In the evening Dr. Smith found the pulse alarmingly quick and very, very weak, without anything to account for it. No pain; no local distress; no excessive discharge.

Dr. Jacob, of Maryborough, was sent for, but nothing local or general could be ascertained with any certainty to account for it, unless it might be the commencement of a latent form of uterine phlebitis. Some calomel had been given on this supposition, but was suspended on account of diarrhœa. Nourishment and wine were liberally given, with benefit to the pulse and strength. The next day, December 14th, I was sent for, and arrived at ten P.M., the report at that time being that the patient was rather better. I found that there had been no rigor; there was neither enlargement of the uterus nor tenderness of it or any part of abdomen; no swelling; no tympanitis; lochia plentiful, but rather pale, and not offensive; urine copious, and passed naturally; pulse 140, very weak and wavy. Upon minute questioning, she told me that she had neither pain nor distress of any kind. Countenance pale, but calm and easy; neither hurry nor distress in breathing; alæ nasi quiet; no headache. I examined the chest very carefully; on percussion it was resonant everywhere; respiratory murmur full and equable; not an abnormal sound throughout. Upon examining the heart, there was no enlargement, but the rhythm of the sounds was destroyed by the disappearance of the first sound; there was no impulse, but the second sound was natural.

This, then, was the only deviation from the healthy condition that I could detect, after a most careful examination of every organ of the body. And what explanation did it afford of the perilous condition of the patient? I confessed that explanation I had none to give; all I ventured to say was, that the uterine system was not in fault, but that the disease was in the heart or circulating fluid.

I lay down about two o'clock, and at five A.M. they came to me to say that the pulse had begun to sink again. I found her in precisely the same condition as before, with that exception. The pulse was 150 or 160; the respiration rapid, but not difficult; and, in spite of strong stimulants, her state went from bad to worse, until she lost the power of swallowing, became insensible, and finally died about eleven A.M., without pain, struggle, or convulsion.

I returned to town, I may frankly confess, very much puzzled, and by no means comfortable; but the mystery was cleared up when I heard, two or three days afterwards, that the nurse and the lady's husband were laid up with a very severe form of scarlatina. I have no doubt that the scarlatina poison, acting on a system weakened and rendered unusually susceptible by delivery, had caused death before the ordinary symptoms of that disease had time to develop themselves.

Case II.—On February 23rd, Surgeon Morgan asked me to visit Mrs. B. with him. She had been confined, February 21st, of her thirteenth child, after a natural labour, and was doing well until the morning of the 23rd, when she awoke with palpitation and a weak pulse of 140, but without pain.

I found the pulse 130, and very weak. There was a nervous tremulousness about her, and a frightened look. She complained of nothing but excessive weakness; no pain, no distress. The uterus felt rather larger than usual, but not tender; lochia quite natural, and without odour. Some milk in the breasts. On examination the lungs appeared perfectly healthy, and there was no abnormal sound in the heart, but the first sound was weaker or less loud than the second.

In short, we could find no satisfactory local cause for the patient's condition, and, in fact, no deviation from organic health, except in the rhythm of the heart. Remembering the former case, I asked if any of the family had recently had scarlatina or measles, but was told that they had not. Under such absence of grounds for correct diagnosis, it was clear that our duty was to treat the prominent symptom (exhaustion) actively, whilst we took some precautions as to certain possibilities.

This we did by the exhibition of stimulants and nutriment, and by poultices to the abdomen. Without troubling the reader with the daily report, I may briefly state that the patient became weaker on the 24th and 25th; at noon of which day Dr. Morgan thought she was dying. No local derangement could be detected at any time, and she took freely, and retained, both food, spirits, and medicine. Her nights were rather restless, and her sleep not refreshing. On the evening of the 25th we determined to try the full exhibition of quinine, and accordingly gave her six grains at bedtime, and three grains every three hours when awake.

The next day there was a perceptible improvement; she had slept better, and felt more comfortable. The pulse was only 120, though weak. The quinine, claret, and Hoffmann's liquor were continued.

Feb. 27th.—A more decided improvement. Pulse 116, fuller and firmer; feels stronger, and had no weakness at noon, as previously. As she complained of headache and singing in the ears, the quinine was omitted, but food and wine continued.

On the 28th I found her so much better that I ceased my attendance. She had slept very well; pulse 104, and fuller; no local distress; no feeling of excessive weakness. From this time Dr. Morgan informs me that convalescence progressed favourably.

Up to this point we were at sea as to the nature of the attack, although we had the benefit of Sir Dominic Corrigan's assistance; but on the evening of the 28th I think the solution of the problem was afforded by the fact of one of the servants showing unmistakeable evidence of scarlatina.

I fear it may be thought that I have extended this chapter to a disproportionate length; but the subject is new in a systematic treatise, and so inadequately understood, that I felt that the main value would consist in a detailed account of the principal facts which have been recorded. When the subject is better known, we shall be able to condense.

CHAPTER XXVII.

PUERPERAL FEVER.

HAVING now terminated the series of abnormal deviations from natural labour, and the various accidental complications of that process, I shall add a chapter or two upon some of the more formidable diseases of childbed.

PUERPERAL FEVER is probably the most fatal disease to which women in childbed are liable, and it is by no means of rare occurrence. Its phenomena vary very much, and it has consequently been differently described, and under various names, such as Puerperal Fever, Childbed Fever, Peritoneal Fever, Low Fever of Childbed, &c. Another source of apparent contrariety has been the *prevalence of the disease epidemically, and the varying characteristics of these epidemics.* Unfortunately, the uniformity of the disease was assumed until comparatively recent times; and, as Dr. John Clarke observes, each author erected his own experience into a standard by which to judge of the descriptions and practice of others.

According to Dr. Hulme's researches, the older writers were not ignorant of this disease. It is described by Hippocrates and Avicenna. Plater (1602) makes it to consist in inflammation of the uterus. Sennert (1656) describes it, and recommends bleeding. Riverius (1674) attributes it to suppression of the lochia, and Sylvius (1674) to deficiency of the lochia. Willis (1682) takes the same view of its nature as Plater. It is mentioned by Reynalde, Pechey, Strother (by whom it was first called Puerperal Fever), and other early English writers; by Viardel, Peu, Mesnard, and other ancient French authors, and by the Germans.

From careful investigation it has been proved that the disease prevails epidemically, and that it is more virulent in hospitals. It is everywhere more frequent among the lower classes than the higher. In Dublin this is even more remarkably the case than in London.

For the purpose of giving a more distinct view of the prevalence of puerperal fever, I have made out (as accurately as possible) a chronological list of the different epidemics, with the names of the authors by whom they are noticed or described, and the pathological characteristics when ascertained.

Date of Epidemic.	Place.	Author.	Characteristics.
1664	Paris	Peu (Lee).	
1746	Paris	Malouin	Peritonitis, Hysteritis, &c.
		Jussieu	Disease of Ovaries.
1750	Lyons	Doulcet	Peritonitis, U. Phlebitis.
1750	Paris	Pouteau	Hysteritis, erysipelatous.
1760	London	Leake	Inflam. of Omentum, &c.
1760–61	Aberdeen	Gordon.	
1761	London	White	Peritonitis.
1767	Dublin	Jos. Clarke.	
1769	London.		
1770	London	Leake	Peritonitis (partial).
1771	London	White.	
1773	Edinburgh	Young.	
1774 to 81	Paris, London, Vienna	Tenon, Doulcet, &c.	
1774–87, 88	Dublin	Jos. Clarke	Peritonitis.
1782	Paris	Doulcet	Peritonitis, Hysteritis.
1783	London	Osborn	Peritonitis.
1785	Vienna	Jaeger	Peritonitis, Phlebitis.
1786	Paris	Tenon.	
1787	Göttingen	Osiander.	
1788	London	Jos. Clarke	Hysteritis, Peritonitis, &c.
1787–8	London	Do.	Peritonitis, Hysteritis, &c.
789–90, 91, 92	Aberdeen	Gordon	Peritonitis.
303–10, 12, 13	Dublin	Collins Douglass	Peritonitis.
1808	Barnsley, Yorksh.	Hey	Peritonitis.
1812–13	Leeds, Yorkshire	Hey	Peritonitis.

Date of Epidemic.	Place.	Author.	Characteristics.
1813	Sunderland, counties of Durham & Northumberland, Dublin	Armstrong	Peritonitis.
1811	Heidelberg	Naegelè. Bayrhoffer.	
1812	Holloway, London	Dun	Peritonitis.
1814–15	Edinburgh	Hamilton.	
1816	Paris	Tenon	U.Phlebitis, Hyster., Perit.
1817–18	Pennsylvania, U.S.	Dewees	Peritonitis.
1818–19, 20–23	Dublin	Collins	Peritonitis.
1819	Vienna	Boer.	
1819	Glasgow	Burns.	
1821–22	Edinburgh	Campbell	Peritonitis.
1821–22	Glasgow, Stirling	Campbell	Peritonitis.
1827–28	London	Gooch	Peritonitis.
1827–28, 29	London	Ferguson	Peritonitis, Hysteritis.
1835–36–38	London	Do.	Phlebitis, &c.
1825-27,28,29	Dublin (Lying-in Hospital)	Collins.	
1829	Paris (Maternité)	Tonnelle	Inflam. of Peritoneum, Uterus, and appendages, and Uterine Phlebitis.
1829–40, occasionally	London, Birmingham, Dublin (Lying-in Hospital)	E. Kennedy.	
1831	Birmingham, Aylesbury	Ceeley.	
1833–34	Vienna	Bartsch	Uterine Phlebitis.
1836–37	Dublin (New Lying-in Hos.)	Beatty	Peritonitis, Pleuritis, &c.
1838	Paris, London.		
1842	Rennes, London.		
1843	Rouen.		
1844	Rouen, Rennes.		
1845	Rouen, Paris, Grätz.		
1846	Rouen, Dublin, Scotland.		
1852	Brakel, Westphalia	Disse	Typhoid Fever.
1854–5	Dublin	M'Clintock	Typhoid Fever.

From a review of the history of the epidemics of puerperal fever, it appears that there is some remarkable connexion between them and lying-in hospitals. I do not mean to assert that the epidemics always originate in and are kept up by these institutions, but I refer to the fact that we have no record of any epidemic independent of them in earlier times. The first in France, England, and Ireland occurred in the Hôtel Dieu of the former, and in the lying-in hospitals of the latter countries; and although our earlier writers allude to inflammation of the womb, &c., occurring in childbed, they make no mention of its prevailing extensively or as an epidemic. No doubt it has since been observed in private practice, in London, Edinburgh, Dublin, Leeds, &c.; but its extent in these cases is, after all, comparatively limited. In Dublin the higher ranks have been singularly free from attacks of the disease. Dr. Joseph Clarke practised for forty-four years in this city, during which time he attended 3847 cases of midwifery, and yet in that number he met with only three cases of peritonitis, and three others where the disease is doubtful, but which may have been uterine phlebitis, although, during that time, puerperal fever was more than once epidemic in the hospital. It has, however, certainly been more frequent of late years.

Perhaps the most general fact connected with puerperal fever is the presence of local disease. In almost all cases of the epidemic, when an opportunity of *post-mortem* examination has been permitted, local lesions of some kind or other have been detected, and even where this opportunity was denied, little doubt was felt by the medical attendants that such existed. It seems very probable, also, that in many cases where the local disease seemed but slight, there would now be recognised very important changes, for we know that a patient may die of inflammation of the uterine veins or lymphatics, with very obscure symptoms, and without either enlargement or obvious tenderness of the uterus, and that these morbid lesions may easily be overlooked if the examination be hasty or superficial. It is only fair, however, to state that Dr. Copland, in an excellent article on puerperal fever, differs from this view. He states that his experience has "convinced him that a most rapidly fatal and a most malignant form of puerperal fever is occasionally developed in lying-in hospitals, which is certainly not characterized by uterine phlebitis nor by purulent collections in the uterus or its appendages, nor even in some cases by peritonitis, the chief lesions often being merely a remarkable alteration of the blood, general lacerability of the tissues, or loss of their vital cohesion soon after death, with a dirty, muddy, offensive, and sometimes a scanty effusion into the serous cavities."* He adds, however, that such cases are rare.

The local affections in puerperal fever embrace all the usual results of inflammation, and involve all the tissues of the organs of gestation, either separately or together. The most frequent appears to be peritonitis, originating very probably in the outer covering of the uterus, but spreading to the entire serous cavity. We find also inflammation of the muscular tissue of the uterus with its consequences, abscess, softening, and gangrene; inflammation of the lining membrane, softening, and gangrene; inflammation of the veins and lymphatics, with the secondary affections thence arising, inflammation and purulent deposits in different organs, muscles and joints; and inflammation of the ovaries, with its consequences.

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* Dictionary of Pract. Med., Part xxx. p. 500.

I must repeat my conviction that there are not many cases of puerperal fever without some local disease of the organs employed in parturition, or of the neighbouring tissues; but are we thence necessarily to conclude that puerperal fever is always simply a local affection, the local disease being primary and the fever secondary? Must we adopt Dr. Robert Lee's opinion, that his "observations are therefore subversive of the general opinion now prevalent, that there is a specific, essential, or idiopathic fever, which attacks puerpĕral women, and which may arise independently of any local affection in the uterine organs, and even prove fatal without any change in the organization of their different textures? As the constitutional symptoms thus appear to derive their origin from a local cause, it would certainly be more philosophical and more consistent with the principles of nosological arrangement to banish entirely from medical nomenclature the terms puerperal or childbed fever, and substitute that of uterine inflammation, or inflammation of the uterus and its appendages, in puerperal women."*

In the former editions of this work I adopted Dr. R. Lee's views, and employed his arrangement; but whilst I confess my obligations to his able researches, and agree with him as to the presence of local lesions generally, I am bound to state honestly and frankly that more extended experience has led me to doubt the accuracy of these views, and to believe that malignant puerperal fever is something more than a local affection, and that the constitutional disease is often rather primary than secondary. At the same time I have no doubt that Dr. Lee's views are applicable to many cases.

What, then, is the essential nature of the malignant epidemic, puerperal fever? This is a question not easy of solution, and one which has led to the expression of very different opinions. It has been regarded as

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* Researches on the more Important Diseases of Women, p. 3.

Inflammation of the Uterus, by

Hippocrates,
Galen,
Celsus,
Aetius,
Paulus Avicenna,
Raynalde,
F. Plater,
Sennert,
Riverius,
Sylvius,
Strother,
Mauriceau,
La Motte,
Sydenham,
Boerhaave,
Van Swieten,
Hoffmann,
Jussieu,
Villars,
Anstruc,
Pouteau,
Denman.

Inflammation of the Omentum and Intestines, by

Hulme,
Leake,
La Roche.

Peritonitis, by

Waller,
Johnson,
Forster,
Cruikshank,
Bichat,
Pinel,
Gardien,
Capuron,
Gordon,
Hey,
Armstrong,
Clarke,
Campbell,
Collins.

Peritonitis connected with Erysipelas, or of an erysipelatous character, by

Pouteau,
Home,
Lowder,
Young,
Abercrombie,
Gordon,
Armstrong,
Hey,
Campbell, &c.

Fever of a peculiar nature, by

Willis,
Puzos,
Levret,
Doublet,
Hamilton.

Disorder of a putrid character, by

Peu,
Tissot,
Le Roi,
White.

Disease of a complicated nature, by

Petit,
Sellè,
Kirkland,
Walsh,
Tenon,
Tonnellè,
Lee,
Ferguson.

Fever with Biliary Disorder, by

Finch,
Stoll,
Doulcet.

If we regard the peculiar characteristics of different epidemics, we find them extremely varied. In one, the lochia are suppressed; in another, they are profuse; and in a third, unaltered. Diarrhœa is common in one epidemic, constipation in another; typhoid symptoms in one, inflammatory in another. And as to the effects of remedies, we find as great a diversity; one high authority recommends saline purgatives, which fail in the hands of other practitioners; another loses all his patients until he bleeds largely at the commencement, whilst others lose all who are so bled. Calomel is the universal remedy in one epidemic, opium in another, purgatives in a third, inunctions in a fourth, turpentine in a fifth, &c. Now, from these variations, the inference is obvious, that the *type of the disease varies in different epidemics, and that the treatment must necessarily differ.* But I think we may go a step further; and if any one will carefully compare a case of simple inflammation of the womb or peritoneum in childbed with a case of malignant epidemic puerperal fever, their symptoms, general and local characteristics, course, and the effects of remedies, they will be obliged to come to the conclusion that, although the latter may exhibit local disease, it is not exclusively nor primarily a local affection.

I should wish to speak very cautiously and guardedly on so difficult a subject, but after a careful comparison of the experience of others with my own, I am inclined to believe that the essential difference between epidemic puerperal fever and simple inflammation consists in a morbid deterioration of the blood in the former case, which is not necessarily present in the latter, or not till an advanced stage; whether this depravation result from some general noxious influence or from some malign peculiarity of the constitution. The following considerations seem to support this view: 1. Puerperal fever prevails most during the winter and spring months, in moist and cold weather, or during alternations of cold and warm moist weather, as the following tables show:—

TABLE I. (*Dr. Gordon's.*)

	Cases of Puerperal.		Cases of Puerperal.
October	13	April	6
November	8	May	6
December	12	June	
January		July	
February	8	August	5
March	6	September	5

TABLE II. (*Dr. Campbell's.*)

	Cases of Puerperal.		Cases of Puerperal.
1821, March	1	1822, January	7
„ April	7	„ February	6
„ May	2	„ March	5
„ June	2	„ April	4
„ July	3	„ May	4
„ August	1	„ June	3
„ September	1	„ July	2
„ October	7	„ August	1
„ November	13	„ September	3
„ December	11	„ October	2

TABLE III. (*Dr. Ferguson's.*)

	1827	1828	1829	1830	1831	1832	1833	1834	1835	1836	1837	1838	Total
January	...	2	3	3	...	2	...	...	2	4	3	9	28
February*	...	2	7	...	...	...	...	...	2	6	...	...	17
March	1	...	3	2	...	...	2	...	...	6	...	8	22
April†	3	...	1	1	4	1	1	3	2	6	3	9	34
May	4	4	...	...	1	...	2	...	5	2	2	...	20
June	...	3	...	...	...	1	2	...	6	4	...	...	16
July	...	3	...	...	...	2	...	...	...	...	...	...	5
August	...	3	1	...	...	...	...	...	...	...	...	...	4
September	2	8	...	...	...	...	1	...	...	...	1	...	12
October	...	4	6	...	...	2	...	...	5	...	...	...	11
November	...	...	...	1	2	...	...	4	2	...	...	...	9
December	...	8	3	...	2	...	1	2	2	3	...	...	21
Attacked	10	37	24	7	9	8	9	9	26	31	9	26	205
Died	1	7	6	2	2	5	3	5	10	9	2	20	68

* Hospital closed Feb. 1838.

† Closed from April to Nov. 1838.

TABLE IV. (*M. Dugès'.*)

	Cases.		Cases.
1819, January	81	1819, July	40
„ February	82	„ August	40
„ March	65	„ September	53
„ April	47	„ October	69
„ May	67	„ November	74
„ June	35	„ December	63

TABLE V. (*M. Delaroche's, Geneva.*)

	Cases.		Cases.
January	77	July	37
February	43	August	36
March	76	September	51
April	55	October	51
May	35	November	66
June	40	December	61

Thus, the most injurious months in Aberdeen were October, December, November; in Edinburgh, November, December, January; in London, January, March, February, December, May; in Paris, November, October, February; in Geneva, January, March, February; and during these months we find other diseases prevail most whose characteristic is depravation of the blood.

2. The two epidemic diseases which most commonly prevail at the same time, and under somewhat similar circumstances, are erysipelas and typhus fever, especially the former, whose presence in surgical hospitals is always indicative of impending puerperal fever. Some have gone further, and expressed their opinion of these diseases being so far identical, as that infection from either erysipelas or typhus fever may give rise to puerperal fever. Mr. Nunneley, in his work on Erysipelas, considers the two diseases to be identical, prevailing during the same atmospheric conditions, exhibiting the same general symptoms, and each capable of reproducing the other. Dr. Hutchinson and others have seen both puerperal fever and erysipelas in the same patient at the same time, and I have noticed that the infants of women attacked by puerperal fever are very liable to erysipelas or diffuse inflammation. It is also beyond question, that infection carried from a patient suffering from erysipelas to a lying-in woman, may in her give rise to puerperal fever. I am not, however, about to contend for the identity of these two diseases, but merely to point

out the great probability that the essential feature of erysipelas is a morbid alteration of the blood, or, in the words of Mr. Nunneley, that "it is highly probable, if not certain, that there is some change produced in the state of the blood, which change may depend upon alterations we are unable at present to appreciate, but which is likely to occur in many tissues, and may thus affect the mass of the blood, more or less quickly, and to a greater or less extent, according to the influence they have upon, and the connexion they have with, the blood in a state of health."*

As to typhus fever, there is evidence on record that women in childbed, exposed to the contagion of typhus, have exhibited all the symptoms of puerperal fever. The late Dr. Labatt mentioned to me that he had known a patient labouring under typhus fever, and brought into the lying-in hospital, originate puerperal fever in patients in the same ward, who had recently been confined. And Dr. Collins mentions a similar instance. No doubt exists at present, I believe, that in typhus fever the state of the blood is much deteriorated, and that this constitutes a most important, if not essential, character of the disease. As bearing upon the present question, I may quote the following passage from Dr. Ormerod:† "Besides the sudden increase, if under such circumstances, of the number of patients suffering from fever, there is observed in all epidemics, from the plague of Athens downwards, a tendency of all diseases to assume, as far as may be, the epidemic type. Much, probably, of this is explicable on the supposition of the existence of the same atmospheric condition affecting all who cannot resist it, in the same way; but however this may be, as far as general impressions in the absence of notes will justify the assertion, simultaneous with the occurrence of fever in the medical wards, phlebitis and troublesome sores are more commonly met with in the surgical wards of this hospital, and erysipelas of the head and face in both." Much more evidence of a similar kind might be adduced, but this is sufficient for my purpose.

3. Sir James Simpson‡ has adduced the analogy between certain forms of puerperal fever and the secondary fever which occurs after great surgical operations, and which there can be little doubt is owing to the absorption of morbid matter. This very closely agrees with the conclusions expressed by Dr. Ferguson, as follows: "1, the phenomena of puerperal fever originate in a vitiation of the fluids; 2, the causes which are capable of vitiating

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* On Erysipelas, p. 72.

† On Continued Fever, p. 168.

‡ Med. Times and Gazette, April 23, 1859, *et seq.*

the fluids are particularly rife after childbirth; and 3, the various forms of puerperal fever depend upon this one cause, and may readily be deduced from it;"[*] and he quotes in confirmation the analogy drawn by Cruveilhier between the surface of the uterus and an amputated stump.[†]

Thus, then, we find that the same seasons give rise to eyripelas, typhus fever, and puerperal fever; that they prevail epidemically at the same time; and as an epidemic take on the same type, and appear capable the one of giving rise to the other, or of co-existing in the same patient. Further, that the symptoms of certain forms at least of puerperal fever are similar to those which occur after great surgical operations, and that the secondary lesions are similar. Now, in erysipelas, typhus fever, and the secondary fever after operations, there can be little doubt of the depraved condition of the blood, and it is highly probable that their low typhoid character is owing to this blood-poisoning. I think, therefore, that the conclusion, that the peculiar character and malignancy of certain epidemics of puerperal fever also depend upon a morbid condition of the blood, however produced, in addition to the local disease, is inevitable.[‡]

Unfortunately, we have but little direct evidence of the state of the blood in puerperal fever. Dr. Arnott's researches have disproved John Hunter's opinion, that phlebitis destroyed life by an extension of the inflammation to the heart; and with other investigations have shown that it is owing probably to deterioration of the blood. M. Bouillaud, in 1825, attributed the typhoid symptoms in phlebitis to a mixture of pus with the blood; and he adduces the experiments of Baglivi, Magendie, and Gaspard, as confirming his opinion, they have produced similar results by the injection of putrid matter into the system. We know from the observations of Dance, Tonnellè, Duplay, Lee, and many others, as well as from our own observations, that pus is found in the uterine veins in considerable quantity in some forms of puerperal fever, and we find that the symptoms described as characteristic of irritative phlebitis closely resemble those of puerperal fever. Mr. Moore states that he "has seen a black precipitate in the blood of a person labouring under the adynamic form of the disease. Such a deposit is often found in typhus and in the last stage of infectious erysipelas and phlebitis. Another similarity between the blood in this affection and in other diseases of a typhoid and malignant character, is the peculiarly offensive odour occasionally arising from it."* In the epidemic which occurred in 1845, in Paris, and which presented the symptoms of low typhus, MM. Bidault and Arnold state that the blood was dark and semi-coagulated, as in low typhus fever.† And in the epidemic which occurred at Grätz in the same year, Dr. Schoeller mentions that the blood was very fluid, and exhaled a peculiar bat-like odour; in other respects it resembled the blood of persons poisoned by prussic acid.‡ Dr. Scanzoni has recently maintained that the special causes of puerperal fever originate in the altered condition of the blood, and consist mainly in the presence of pus.§ In a case of puerperal peritonitis, on the evening of the second day, Dr. Simon found that the blood formed a tolerably firm clot, and was covered with a buffy coat of an inch and a half thick; the chemical analysis furnished similar results to those obtained by MM. Andral and Gavarret. In cases of metro-peritonitis, quoted by Dr. Day, from the analysis of Scherer, Haller, Becquerel, and Rodier, the blood presented an increase of fibrin, and a great diminution of blood corpuscles. Dr. Copland states that he is not acquainted with any analysis of the blood in the most malignant form of puerperal fever, except that which Dr. Day quotes from Haller, who states that the blood was of a very dark-brown colour. The clot was dark, of a loose consistence, and covered by a buffy coat, over which was a delicate membrane, which presented under the microscope a firmly granulated appearance and fat vesicles. The serum was turbid, but after standing for some time it became clear; its reaction was alkaline; its specific gravity 10·25. The fibrin was 5·16; the blood corpuscles, 77·52. According to Becquerel and Rodier, the cholesterin and phosphates are increased.

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[*] On Puerperal Fever, p. 53.

[†] Anat. Path., Liv. 13.

[‡] For further details, I refer the reader to a review in the Brit. and For. Med.-Chir. Review for October, 1855, to Dr. Murphy's paper in the Dublin Quarterly Journal, Aug. 1857, Dr. Fordyce Barker's able paper, read before the New York Academy of Medicine, and to Sir James Simpson's valuable lectures in the Med. Times and Gazette, beginning April 23, 1859.

Although the evidence I have now adduced may not be sufficient to *prove* that depravation of the blood is the sole or essential cause of malignant puerperal fever, I think it affords ground for believing that the general element which constitutes the difference between this form of puerperal fever and simple inflammation of the uterus and peritoneum, may consist in some form of deterioration of the blood, depending either upon atmospheric malaria from without, or absorption of some noxious matter generated within the body. At all events, I cannot but agree with Mr. Moore, that "in puerperal fever, typhus, cholera and other epidemic and contagious diseases belonging to the class *neuroses,* there is, besides inflammatory action, another element, unknown, but which has an essential influence upon the intercurrent phlegmasiæ arising in their course, and which may yield at one point only to appear at another."[*]

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* On Puerperal Fever, p. 183.

† Gazette Médicale, Aug. 1845.

‡ Med. Jahrbüch. der K. K. Oester. Staates, Oct. 1845.

§ Ranking's Abstract, vol. vii. p. 335.

Various *causes* have been assigned for the production of this disease: it has been attributed to difficult labour,[†] to uterine inflammation,[‡] to an accumulation of noxious humours,[§] to violent mental emotions, stimulants, and obstructed perspiration;[||] to miasmata; to admission of cold air to the body and into the uterus; to hurried circulation; to suppression of the milk; to diarrhœa;[¶] to putrid contagion from alteration in the fluids during pregnancy;[**] to hasty separation of the placenta; to too tight application of the binder;[††] to sedentary employment; to stimulating or spare diet; to fashionable dissipation; to retained portions of placenta; to floodings from non-contraction, according to Mr. Skey; from violence, but not from want of contraction, according to Dr. Armstrong; to inflammation of the intestines and omentum, from pressure of the gravid uterus;[‡‡] to atmospheric derangement; to erysipelas, metritis, or phlebitis, and to contagion of a specific kind.

A word or two upon some of these supposed causes may not be out of place. I do not think we can fairly regard difficult labour as a direct cause,[§§] although the condition in which the woman is left may render her more obnoxious to the epidemic. Primiparæ certainly are more liable to be attacked,[||||] and also patients who at the time of labour are in a weak, reduced state.[¶¶] Dr. Matthews Duncan's researches have led him to conclude that "the mortality from puerperal fever following first labour is about twice the mortality from puerperal fever following all subsequent labours taken together; and that as the number of a woman's labours increases above nine, the risk of death from puerperal fever increases with the number."*

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[*] On Puerperal Fever, p. 126.

[†] Of 1116 cases in the Dublin Lying-in Hospital in 1819-20, 68 were first labours; but they were not remarkably tedious.

[‡] F. Plater, Prax. Med., 1686, vol. ii., chap xii. Hoffmann, 1734, vol. iv. part i. Burton, 1751, Essay on Midwifery, part iv. Smellie, Tissot, Kirkland, Denman, &c.

[§] Sennert, Opera, vol. ii. part ii.: Ulcers, b. ii. ch. 5.

[||] F. Cooper, 1766, Comp. of Med., part iii. sect. iii. Leake, vol. ii. part xxxiii.

[¶] R. W. Johnson, 1769, New System of Midwifery, part iv. chap. vii.

[**] J. Miller, 1770, Obs. of Prevailing Diseases, part iii. ch. ii.

[††] Manning on Female Diseases, ch. xx.

[‡‡] Dr. Hulme on Puerperal Fever, p. 147.

[§§] Armstrong on Puerperal Fever, p. 2.

[||||] Collins' Pract. Treatise, p. 384.

[¶¶] Dr. Jos. Clarke's Essay, Med. Comment., 1791, p. 311.

Mental emotion may undoubtedly be considered an effective predisposing cause. Under its influence females are peculiarly exposed to puerperal fever, and less able to bear it; thus it has been remarked, that unmarried women are often victims.† Several of the worst cases I have seen were mainly attributable to this cause. Cold may fairly be admitted into the list of causes. Portions of placenta remaining in the uterus, and putrefying, may, I believe, give rise to puerperal phlebitis, although this is by no means invariably the case. Gastro-enteric irritation may certainly be propagated to the neighbouring tissues; and cases which appeared simple at first may thus assume the character of puerperal fever, especially during an epidemic.

That hæmorrhage during or after labour does not prevent puerperal fever, we have abundant proof; but that it renders a patient more liable to it, except so far as it reduces her strength, may be doubted.

To a considerable extent, as we have seen, the state of the atmosphere influences the disease; in damp, moist weather, it is much more prevalent, and less so in warm, dry weather. Whatever that which we call epidemic influence may be, there can be no doubt that to it the majority of cases are attributable, especially the worst and most fatal.

Another very important question yet remains for our investigation—viz., that of the *infectious or contagious nature* of puerperal fever, particularly when it is epidemic. Of the simple cases of peritonitis or phlebitis after labour, occurring sporadically, I do not know that any one considers them contagious; but of the low malignant fever, opinions have varied considerably. Drs. Hulme, Hey, Armstrong, Baudelocque, Tonnellè, Jacquemier, Kiwisch, Dewees, Meigs, &c., deny the contagion; Drs. Gordon, Young, Clarke, Denman, Burns, Davis, Hamilton, Blundell, Gooch, Mr. Ceely, Drs. Ramsbotham, Rigby, Lee, Copland, Channing, Holmes, &c., affirm it.

In all cases where a disease is epidemic, it is, and ever must be, a difficult matter to decide as to the extent of its infectiousness, because, in order to be exposed to either the contagion or infection, a person must also necessarily be placed in circumstances favourable to the exertion of its influence as an epidemic. But after a close and careful examination of the history of epidemics, of the cases recorded, and of the opinions of men of the greatest experience, I believe that the weight of evidence is in favour of puerperal fever being infectious and contagious—*i.e.*, that it may be communicated from a patient labouring under it to another who is in contact or close neighbourhood with the affected party.

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* Ed. Med. Journal, Sept. and Oct. 1865.

† Home: Chir. Exp., p. 83.

Leaving the general question of contagion from one patient to another, let us for a short space examine into the evidence in favour of the communicability of the disease by a third party from a patient labouring under it to another during or after her delivery, as this has a direct practical bearing upon the duties of medical men. The exact value of the facts on record will be better estimated by a little classification.

1. It seems impossible to doubt that contagious matter capable of exciting puerperal fever may possibly be conveyed by a third party unaffected by it; for example, in the cases on record of puerperal fever following the services of medical men and nurses who were in attendance upon erysipelas immediately before. The instances are too remarkable and too numerous to be regarded as coincidences, nor would even the prevalence of an epidemic of puerperal fever at the time invalidate our conclusions; it might certainly render the cause more influential.

2. It is the recorded opinion of Rokitansky, Semelweiss, and others, that morbid matter acquired in the dissection of subjects not dying of childbed fever may be conveyed by the dissector, and excite the disease in a patient delivered by him; and to this, among other causes, has been attributed the presence of puerperal fever in the wards of the Vienna Lying-in Hospital. A celebrated foreign practitioner attributed two outbreaks of this disease among his private patients to his having handled morbid specimens just before attending a patient in her accouchement. At the same time, it appears to me that some writers form very hasty conclusions. A German writer, of high standing, states that perhaps the poison may be absorbed by the uterus at the water-closet, quite forgetting that the vagina is ordinarily a closed canal, by contact of its anterior and posterior surfaces.

3. We should, therefore, have less difficulty in believing that similar effects may be produced by those passing from the dissection of puerperal patients to the delivery of healthy ones, especially if the most rigorous precautions were not observed. For instance, in the autumn of 1821, Dr. Campbell, of Edinburgh, attended the dissection of a married woman who died of the disease, after an abortion of the early months; he removed the

pelvic viscera and external parts, and carried the whole in his coat-pocket to the class room. The next morning, dressed in the same clothes, he assisted, with some of his pupils, at an instrumental delivery at Bridewell. This woman was seized with the same affection, and died. The same night he accompanied Dr. Orr to the delivery of a woman residing in the north back of the Canongate; she was equally unfortunate; and three other poor women shared the same fate in quick succession. In a subsequent year, 1823, he assisted at the dissection of a childbed fever case, but could not wash his hands with the care he desired; thence he went to attend two other women in labour, both of whom died of puerperal fever. At a meeting of the College of Physicians, Philadelphia, U.S., Dr. Warrington stated that, after assisting at an autopsy of puerperal peritonitis, he was called upon to deliver three women in rapid succession. All these women were attacked with different forms of what is commonly called puerperal fever. "Mr. Davies states that in the autumn of 1822 he met with twelve cases, while his medical friends in the neighbourhood did not meet with any, or, at least, with very few. He could attribute this to no other cause than his having been present at the examination of two cases, and his having conveyed the infection to his patients, notwithstanding every precaution." "A young surgeon, shortly after examining the body of a sporadic case that had died, delivered three women, who all died of puerperal fever." "Mr. Ingleby states that two gentlemen, after the *post-mortem* examination of a case of this disease, went in the same dress, each respectively, to a case of midwifery. The one case was attacked in thirty hours afterwards, the other in three days. One of the same surgeons attended, in the same clothes, another female, and she was attacked on the evening of the fifth day, and afterwards died."*

Now with regard to cases attended immediately after the *post-mortem* dissection, there seems little room for doubt as to the exciting cause of the fever. It may have been conveyed in the clothes or on the hands of the accoucheur, but it is, at any rate, adequate to the effect, and the sequence is too simple and too close to be rejected.

4. Can we venture to say the same of the following case: Dr. Merriman mentions in the Lancet for May 2nd, 1840, that he was present at the examination of a case of puerperal fever at two P.M. *He took care not to touch the body.* At nine o'clock the same evening he attended a woman in labour; she was so nearly de-

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* Copland's Dictionary. Art. Puerperal Fever.

livered that he had scarcely anything to do. The next morning she had rigors, and died in forty-eight hours. We do not know whether puerperal fever was epidemic at the time, but the cause suggested seems so inadequate, and the time so short, that we should be inclined to look for some other explanation.

5. So far, then, we have seen medical men engaged in handling morbid matter, their dress and persons exposed to the effluvium from dead bodies, and passing directly to attendance upon lying-in women; here we have a distinct, appreciable exciting cause adequate to the production of disease in healthy persons, and which may have been, and probably was, conveyed to the patients who were first attended, and in whom puerperal fever appeared. But in several instances the disease was not confined to the first women attended, but appeared in others delivered successively. How are we to explain this, and how can we explain the pertinacity with which puerperal fever seems occasionally to track the footsteps of one or two practitioners, whether at first lighted up by morbid matter derived from dissection or not? Take the following examples. Dr. Gooch mentions that "a general practitioner, in large midwifery practice, lost so many cases from puerperal fever, that he determined to deliver no more for some time, but that his partner should attend in his place. This plan was pursued for one month, during which not a case of the disease occurred in their practice. The elder practitioner being then sufficiently recovered, returned to his practice, but the first patient he attended was attacked by the disease, and died." This latter fact seems to us to prove that the disease was epidemic at the time. Similar instances have come to our own knowledge more recently. Dr. West, of Philadelphia, states that seven females delivered by Dr. S. Jackson, in rapid succession, were all attacked with puerperal fever, and five of them died. These were the only cases that occurred in that district, for the women became alarmed, and sent for other assistance. A physician in Boston, U.S., had the following consecutive cases:—On March 24th, April 9th, 10th, 11th, 27th, and 28th, and May 8th, seven in all, of which five died. He then left town. Another physician writes to Dr. Holmes as follows:—"The first case was in February, 1830, during a very cold time. She was confined on the 4th, and died on the 12th. Between the 10th and 28th of this month I attended six women in labour, all of whom did well except the last, as also two who were confined March 1st and 5th. Mrs. E., confined February 28th, sickened and died March 8th. The next day, March 9th, I inspected the body, and the night after attended a lady, Mrs. G., who sickened and died on the 16th.

The 10th I attended another, Mrs. B., who sickened but recovered. March 16th I went from Mrs. B.'s room to attend a Mrs. H., who sickened and died on the 21st. The 17th I inspected Mrs. G. On the 19th I went directly from Mrs. H.'s room to attend another lady, Mrs. G., who also sickened, and died on the 22nd. While Mrs. B. was sick on the 15th, I went directly from her room, a few rods, and attended another woman who was not sick. Up to the 20th of the month I wore the same clothes. I now refused to attend any labour, and did not until April 21st, when, having thoroughly cleansed myself, I resumed my practice, and had no more puerperal fever. The cases were not confined to a narrow space. The two nearest were half a mile from each other, and half that distance from my residence. The others were from two to three miles apart. There were no other cases in their immediate vicinity."

Dr. Ramsbotham has known the disease to spread through a particular district, or to be confined to the practice of a particular person, almost every patient being attacked by it; whilst other practitioners had not a single case; and he considers the distemper as being capable of conveyance not only in common modes, but through the dress of the attendants on the patients. In Sunderland, 40 out of 53 cases occurred in the practice of one surgeon and his assistant. Dr. Roberton, of Manchester, states, that between the 3rd of December, 1830, and January 4th, 1831, a midwife attended 30 patients of a public charity, 16 of whom had puerperal fever, and all died. Other midwives of the same institution attended 380 women during the same time, and none suffered from it. He also mentions the case of a practitioner, who introduced the catheter for a poor woman in puerperal fever, late one evening, and attended a lady in her confinement during the same night, who was attacked with puerperal fever on the second day.

Analogous cases have been recorded by Dr. Pierson, of Salem, U.S., Dr. Peddie, and Mr. Beecroft; and such examples are, doubtless, very startling, and require a careful examination, to ascertain their exact value as bearing on the question at issue; but we shall first hear what Dr. Meigs says on the other side. His first argument is from personal experience :—" I have practised midwifery for many long years. I have attended some thousands of women in labour, and passed through repeated epidemics of childbed fever, both in town and hospital. After all this experience, however, I do not upon careful reflection and self-examination, find the least reason to suppose that I have ever conveyed the disease from place to place in any single instance.

Yet for many years I carefully considered whether such a transfer by a third person might be possible, and carefully read the statements of various authors to that effect. In the course of my professional life, I have made many necroscopic researches of childbed fever, but never did suspend my ministry as accoucheur on that account. Still I certainly never was the medium of its transmission. I have, in numerous instances, gone from the bedside of women dying of childbed fever, whether sporadic, or the most malignant degree epidemic, without making my patients sick. I have also endeavoured to assist my brethren, when they had such cases and I had none. In a series of labours, 468 in number, and beginning with No. 1, I find that Nos. 18 and 19 were affected, and that No. 18 died with childbed fever; No. 31 was sick, but recovered; Nos. 195 and 259 were sick, but recovered; but 291 died, as did also 293. Nos. 332, 339, 435, 444, and 445 were attacked, and recovered. The above cases—viz., 18, 19, 31, 195, 259, 291, 293, 332, 339, 435, 444, 445, 455, are, in all, 13 cases in 468 labours, of which 3 died and 10 recovered. Now, if I was the medium of contagion for any one of that series of 468 confinements, why did I poison them in the ratio and order above set forth; and why did I not communicate the disease in more than 13 out of 468 cases? What became of my nebula from 31 to 195; to 259, and between 291 and 445, and so to the end, or 468? Such a table is far more easily explained by regarding the falling-out of the cases as coincidences and accidents, than as material causations, through a private pestilence."

Again, as regards the singular limitation of the disease to the practice of one person, Dr. Meigs observes: "At page 631 of my work On Obstetrics, second edition, I have related the circumstances attending the practice of a physician at Philadelphia, who in one of our epidemic seasons, lost a considerable number of women in childbed. His patients were scattered over a great superficies of the city and districts, some of them being more than two miles from the others. At that time many women were attacked, in various parts of Philadelphia, as well as in the state of Pennsylvania; yet, so far as has come to my knowledge, no other medical gentleman happened to encounter such a great number of childbed fevers as he did. I visited, in consultation with him, some of the very worst of the cases, and touched the patients, and was as liable to imbibe or to be clothed with the effluvia from the bodies as he was; nevertheless, I did not carry poison or other cause of the disease to any patient of mine; and if not I, then how should he become capable of doing so? He is a gentleman who is scrupulously careful of his personal appearance, of great experience as a practitioner, and well informed as to modern opinions on the contagion of childbed fever. Still those of you who are contagionists will say that he carried the poison from house to house, and if so, then you ought to give some *rationale* of the fact. Did he carry it on his hands? But a gentleman's hands are clean. Did he carry a nebula or halo about him? Then why not I also? If the nebula adhered to his clothing, it might as well have adhered to mine. What will you say, young gentlemen, of the experience of my friend Dr. D. Rutter, formerly of Philadelphia, but now of the city of Chicago, who passed through terrible scenes here, in an epidemic of childbed fever, some years ago, when he had a most extensive midwifery practice in town and country? During that sad time, I saw several fatal cases with him in consultation; and though he seemed to be tracked by the cause of the disease, to judge by the numerous attacks of it in his lying-in patients, I was not tracked by it. I took no precaution, except such as every decent man should be supposed always to take; yet I never did carry the disease from his cases to any houses where I visited lying-in women. But he was charged with being a carrier of contagion. How could he carry the cause? What was the cause? Was it some ozone that stuck to his hands or coat? Was it a nebula, a halo, or a miasm that mixed with the hairs of his head or the woollen or cotton fibres of his dress? or an exhalation from his skin, or a halitus from his lungs, like the fiery breath of Cacus? And can you say of him, as Virgil sings—

> "'Faucibus ingentem fumum, mirabile dictu,
> Evomit.'—*Æneid*, lib. viii. p. 252.

Come now, was not such poison more sticky than birdlime, seeing that Dr. Rutter, worn out with fatigue, and wounded in spirit by his cares for the unfortunate victims of an epidemic disease, left the city for the purpose of gaining some strength, and to escape from the repetition of such disheartening labours, and that even a quarantine could not liberate him from this poisoned cloud? One might hope it would have been blown away by the wind, or that it would have evaporated or become too dilute to kill, after a ride of seventy miles, and an absence of ten days. But it happened, after this rustication of ten days at a distance of thirty-five miles from the city, that your birdlime or cloud still adhered to him, as your contagionists would say. And more than that, he could not even wash it away or shave it off; for upon coming back to the city, and to his professional toil, before he engaged in practice again, he caused his head to be close shaved; he entered a warm bath and washed himself clean; he procured *a new wig, new clothes, new hat, new gloves and new boots.* He did not *touch* anything he had worn, and took the precaution to leave his pencil at home, and his watch. Well, what do you think happened next? He went out to attend a lady in labour, who had a favourable parturition, yet was next day assailed by a horrible childbed fever, of which she died in spite of all his efforts, and mine to help him; for he called me in consultation immediately after being summoned himself to her chamber. I know that that lady died with peritonitis. I was a great deal with her in her illness, but she did not poison me or my clothes; for although I went on with my practice, I poisoned nobody, and made nobody have even so much as a finger-ache. Dr. Rutter repeated this attempt at personal disinfection at a subsequent period, which was two years later, and with the same ill-success. The gentleman was much and disparagingly spoken of on account of the above-mentioned events in his practice, which I cannot but regard as both cruel and unjust, particularly as his success in the treatment was most brilliant; for during the epidemic he had charge of seventy cases, of which he lost only eighteen, and I know not the man who can boast of a higher triumph of his art of healing in this malady."*

Let us now look a little closer into this matter. The broad fact apparently established by the foregoing observations is, that puerperal fever does sometimes prevail chiefly, or is altogether limited, to the patients of certain practitioners, and the question arises, To what is this owing? The question is *not*, whether contagion is the only, or the chief, or the ordinary means by which the disease is propagated; for it is admitted on all hands to prevail epidemically. Nor is it the question, whether, under favouring circumstances, contagion may not be conveyed to the patient by the accoucheur, for we have related cases in which it seems impossible to doubt that this took place. We must therefore eliminate from the foregoing examples the case of the physician who wrote to Dr. Holmes, because having made *post-mortem* examinations, his experience may rather be referred to section 3. In most of the instances, we are not told whether the practitioner examined the bodies after death; if they did, we cannot deny that there was a possibility that they might have carried the infection.

Again, if, as Dr. Rigby remarks, "the discharges from a patient in puerperal fever are highly contagious," it is at least possible that the case of the midwife mentioned by Dr. Roberton may be thus explained, inasmuch as her duties about her patients would necessitate more or less contact with the excretions.

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* On Childbed Fever, p. 102.

Excluding these classes of cases, evidence enough remains to show that the fever does sometimes follow in the track of particular accoucheurs; and the real question before us is, whether it does so by contagion conveyed by him from other patients, in spite of the ordinary precautions, or in certain cases, notwithstanding the extraordinary precautions of baths, change of air, change of clothes, &c., or whether in such cases the prevalence of an epidemic of puerperal fever is a sufficient explanation, admitting it to exhibit caprices similar to other epidemics. It is impossible to bring the matter to a demonstration either way, difficulties meet us upon either supposition, and perhaps the best plan to adopt will be for us to weigh these difficulties separately.

Against the explanation which attributes, with Dr. Meigs, all to epidemic influence, is the fact of its greater prevalence in the practice of certain medical men, and its being in some cases apparently limited to them. That one man should see more cases than another of any epidemic disorder is common enough, and would be no difficulty in the present case; but that one should see all, and others none, does seem rather startling. But is the proof of the latter sufficiently conclusive and sufficiently extensive? Dr. Gooch does not tell us whether the disease was epidemic or not, nor does Dr. West. The gentleman who wrote to Dr. Holmes states that no other cases occurred in the vicinity, but we have rejected his example as being one of *possible* contagion on the ground of his *post-mortem* examinations. In Sunderland there were at least thirteen cases which occurred in the practice of others, besides the surgeon and his assistant. The two examples related by Dr. Meigs occurred during epidemics. So that it must be confessed that the evidence we possess to show the insufficiency of epidemic influence as an explanation, and the necessity of finding some other cause for its greater prevalence in a particular direction, is neither extensive nor positive.

The explanation which attributes this peculiarity to contagion has the merit of being simple and apparently adequate, but the difficulties on examination are more numerous and fully as great. Assuming for a moment that the disease can be only communicated during labour, let us recal to our readers what takes place during an ordinary visit to a patient in puerperal fever, during which time the infection is to be taken. The visit may occupy five or ten minutes, the physician stands by the bed, feels the pulse, examines the abdomen, but does not come in contact with the discharges. Having made his investigations, he washes his hands carefully, and then pays more visits, passing through the air, until evening, or until he is called to a labour. If many hours elapse, he must have washed his hands several times. Yet, in spite of all this, we are to suppose that he carries morbid matter on his hands or clothes, acquired from the fever patient, enough to poison the lying-in woman. And not only this, but the explanation is supposed to be equally valid even though he change his clothes, thus limiting the infection to the hands, and even though he use chloride of lime or potash. If the morbid matter be conveyed on the hands, the infection, we suppose—and such seems to be the general opinion—must be imparted during labour; but if on the person or clothes, the effect might, of course, be produced subsequently, and hence another difficulty. During the visit the consulting physician is as close to the fever patient, examines her, handles her quite as much at the visit as her ordinary attendant, and, it may be assumed, adopts afterwards much the same precautions. Yet we do not hear of his conveying the fever to his own patients in any case, and we have Dr. Meigs' positive statement that such an occurrence never took place in his practice. The advocates of contagion should explain this.

Again, in all contagious diseases the intensity of the contagion imparted to, and conveyed by, a healthy person (as in scarlatina, for example) must surely be in proportion to the shortness of the time which elapses between his visit to the sick person and to the party to whom he conveys it: in other words, that his chance of so conveying it would diminish with the lapse of time. For example, an accoucheur visits a patient in puerperal fever, suppose, and acquires this contagious property; if this rule be true, the first patient he attends will be more liable to take the disease than the second, and the second than the third. How then explain the fact, on the principle of contagion, that no such sequence of attacks is observed? The cases affected observe no such order, as the reader will see by turning back to Dr. Meigs' registry.

Moreover, in two of the most striking cases we have quoted, Dr. Gooch's and Dr. Rutter's, there is a circumstance which is not reconcileable with, or explicable by, the doctrine of contagion, as we understand it. In the one case a month, and in the other ten days, of absence elapsed, and the latter was accompanied by a complete renewal of clothing, and yet the first case attended by both was attacked by puerperal fever. Are we to attribute this to remaining contagion, and, if not, does it not point directly to some other influence which may have operated previously as well?

Thus, a belief in the contagiousness of puerperal fever under ordinary circumstances, and excluding the cases in sections 1, 2, and 3, must involve, on the one hand, the conclusion that it is of all contagious disorders the most virulently contagious, inasmuch as it assumes that it can be conveyed by a healthy person exposed for a few moments only to its influence, to a third party hitherto in health, and this notwithstanding that the hands, the only part in contact with the sick person, have been carefully washed, the clothes changed, and the entire person exposed to the air, it may be, for hours; and yet, on the other hand, that this contagious property limits itself to the ordinary attendant, and does not affect the consulting physician. Admitting that we cannot fully and satisfactorily explain the limitation of the disease on the supposition of epidemic influence only, I ask the reader whether the difficulties attendant upon the explanation by contagion are not more insuperable?

In conclusion, therefore, whilst I feel compelled by the evidence on record to admit the possibility of puerperal fever being conveyed and communicated or excited by those who attend midwifery cases after being employed in dissection or *post-mortem* examinations, and also by those who are much in contact with the fever patient or the discharges, especially if strict precautions are not adopted as to cleanliness and change of dress; I do not feel that in other cases, where no such conditions exist, that the evidence at all justifies our attributing the spread of the disease to contagion, and I think fewer difficulties and contradictions are incurred by attributing its extension to epidemic influence, and its limitation to conditions or circumstances of which we are at present ignorant.

Now, what are the precautions which ought to be taken by persons who practise this branch of the profession? We have seen that in all probability the contagion if at all conveyed is so either by the clothes or the hands of the practitioner, from a patient labouring under the disease, or from the dead body. I would suggest the following:—1. That when engaged in close attendance upon a patient labouring under puerperal fever, the medical attendant should, if possible, procure a substitute to attend any new case of labour; but if he cannot, then, 2. He should, before such attendance, change every portion of his dress, and wash his hands in a solution of chloride of lime, as well as in soap and water. 3. Dr. Semelweiss' suggestion of paring the nails close, is worth adopting, as particles of morbid matter may easily be concealed underneath, and applied to the mucous membrane of the vagina. 4. At the termination of each visit to a patient in puerperal fever (or in any infectious disease), the hands should be carefully washed with soap and water before leaving the room, and his clothes repeatedly changed and well-aired. 5. That if a medical man have patients in childbed, one of whom should be attacked by puerperal fever, his daily visit should be first paid to the other patients and afterwards to the puerperal case, if the distance permit of his so doing. 6. It will be wiser for any one engaged in midwifery practice to procure an assistant to make *post-mortem* examinations for him; and if he be present, he ought not to wear the same dress in attending obstetric cases until it have been well aired. If the autopsy be made by himself, extraordinary precautions should be taken as to repeated ablution, with solution of chlorate of lime, &c., and a complete change of dress; or perhaps, as Dr. Copland suggests, he ought to allow some days to elapse before attending obstetric cases. 7. These remarks apply to all autopsies, no matter of what disease the subject died, although they are more stringent in cases of death from puerperal; and also to attendance upon and dressing cases of erysipelas, diffuse inflammation, &c.

In treating of puerperal fever, various arrangements or classifications have been adopted to include the different forms of the disease. Thus Dr. Douglas describes three forms:—

1. The inflammatory.
2. The gastro-bilious.
3. The epidemic or contagious (typhoid).

M. Tonnellè:—

1. The inflammatory.
2. The adynamic.
3. The ataxic (irregular or nervous).

M. Martens:—

1. The inflammatory (where one organ only is affected).
2. The nervous (beginning with delirium).
3. The putrid.

M. Vigarous:—

1. Gastro-bilious.
2. Putrid bilious.
3. Pituitous (vomiting of pituitous matter).
4. Hysteritis (phlogistic).
5. Sporadic (arising from cold).

M. Gardien:—

1. Angiotemic fever, strictly inflammatory.
2. Adeno-meningic; slow, insidious fever, slimy tongue.

3. Meningo-gastric; bilious derangement, yellow skin, &c.
4. Adynamic.
5. Ataxic, or nervous.
6. Fever, with local phlegmasiæ.

Dr. Gooch:—

1. Inflammatory.
2. Typhoid.

Dr. Blundell:—

1. The mild epidemic, with little peritonitic tendency.
2. Malignant epidemic, with great pain.
3. Sporadic; peritonitis, limited.

Dr. John Clarke:—

1. Inflammation of the uterus and ovaria.
2. Inflammation of the peritoneum.
3. Inflammation of the uterus, fallopian tubes, or peritoneum, connected with inflammatory affection of the system.
4. Low fever, connected with affection of the abdomen, which is sometimes epidemic.

Dr. Robert Lee:—

1. Inflammation of the uterus, peritoneum, and peritoneal sac.
2. Inflammation of the uterine appendages, ovaria, fallopian tubes, and broad ligaments.
3. Inflammation of the mucous and muscular, or proper tissues of the uterus.
4. Inflammation and suppuration of the absorbents and veins of the uterine organs.

Or, in other words—

1. Inflammatory puerperal fever, dependent on peritonitis.
2. Congestive, dependent on inflammation of the uterine muscular tissue.
3. Typhoid, arising from venous inflammation.

Dr. Ferguson:—

1. The peritoneal form.
2. The gastro-enteric.
3. The nervous.
4. The complicated.

Dr. Copland, in the very valuable article in his Dictionary, treats—

1. Of the inflammatory states of puerperal fever, or inflammation—*a*, of the uterus; *b*, of the ovaria and tubes; *c*, of the peritoneum; *d*, of any two, or all of them.
2. Synochoid puerperal fever, complicated with inflammation—*a*, of the peritoneum; *b*, of the uterine veins; *c*, of the uterus and appendages.

3. Adynamic or malignant puerperal fever—*a*, simple; *b*, complicated with predominant alteration (*a*) of the blood and (*b*) of the fluids and peritoneum; (*c*) of the fluids, serous surfaces, and soft solids generally; (*d*) of the uterus, or of the uterus and appendages; (*e*) of the internal surface of the uterine vessels, substance of the uterus, &c.

No doubt each of these arrangements has its advantages and disadvantages, nor is it very easy to propose one free from objection. I shall take as a basis for the one I adopt, the fact, as I believe, that in nearly all cases there exists local disease, and also that malignant puerperal fever is more than a mere local affection; in fact, an essential fever. We shall first, then, treat of the local forms of puerperal fever, such as we see it when it occurs sporadically, or in certain epidemics; and then of the malignant form, which may have for its local complications any of the preceding diseases. And lastly, I shall interpolate a section on a gastro-enteric affection of childbed, which in some of its characteristics resembles an attack of puerperal fever.

The classification will then stand thus:—

1. Puerperal peritonitis.
2. „ hysteritis.
3. Inflammation of the ovaries and uterine appendages.
4. Uterine phlebitis.
5. Inflammation of the absorbents.
6. Gastro-enteric fever.
7. Malignant puerperal fever.

Or in another aspect, we may say—

1. Inflammatory fever.
2. Gastric fever.
3. Malignant fever.

I am very far from thinking this arrangement perfect; one very obvious defect, but which I see no way of remedying, is that several of the local affections which are here separated do in practice occur together. Thus, hysteritis, or ovaritis, is often accompanied by peritonitis, and uterine phlebitis may occur with hysteritis, or inflammation of the absorbents. Still, however, there is a broad line of distinction in many epidemics; and I must only guard against the defect of such arrangement by stating strongly at the commencement, that I do not intend to describe the varieties as essentially and widely distinct as to symptoms, causes, and course in every epidemic; and in the course of the description endeavour to point out the coincidence and the limitations of the local affections.

It may give an idea of the comparative frequency of the local affections if I quote the experience of MM. Tonnellè and Dugès.

In 222 cases, M. Tonnellè found—
Peritonitis in 193.
Alterations of uterus and appendages in 197.
Combined lesions of uterus and peritoneum in 165.
Peritoneum alone affected in 28.
Uterus alone in 29.

In 266 cases, according to M. Dugès—
The uterus was affected in three-fourths;
The ovaria in one-seventh of the cases.
There was perforation of the stomach—10 cases in 266.
Inflammation of the stomach and intestines—4 „ 266.
Pleuritis, single or double . . . . . . 40 „ 266.
Pericarditis . . . . 6 „ 266.
Arachnitis . . . . 1 „ 266.
Purulent deposit in muscles . . . . . 8 „ 266.

I shall now proceed to consider the special forms of the disease.

I. Inflammation of the Peritoneum.—This variety of the disease was the one chiefly observed in the epidemics in London, Aberdeen, Leeds, Edinburgh, and formerly in Dublin; and it has occurred in other epidemics. It appears to affect the peritoneum covering the uterus primarily, and to extend from thence to the remaining portion of the serous membrane, involving not unfrequently the uterine appendages.

The attack may commence even before delivery, of which I had an example; but more generally from twenty hours to three days afterwards. Dr. Joseph Clarke mentions that two of his patients were ill during labour; three were attacked on the second day, one on the fourth, and one on the ninth day. In the epidemic of 1788, one was attacked four days before delivery, one on the day of delivery, eight on the second day, and three on the third.*

Symptoms.—The first symptom is either sudden rigors, pain, or some variation in the pulse. Dr. Campbell has remarked that in some who were attacked early, the sinking of the pulse which takes place after delivery in ordinary cases, was absent, and its frequency rather increased. Generally speaking, the rigors are first noticed; to these succeed heat of skin, flushed face, quickened pulse, and hurried respiration. The heat of skin, however, soon subsides, and during the course of the disease it may not exceed the natural standard. To these symptoms succeed nausea, vomiting, pain in the head, and increased sensibility of the uterus. In some cases the uterine tenderness (not amounting to pain) is contemporary with the rigors, or immediately succeeds them. Pain in the abdomen soon attracts notice. It generally commences in the hypogastrium, or in one of the iliac regions, gradually radiating over the abdomen. The pain may be slight or severe, continuous, or in paroxysms—the intermissions being more remarkable as the disease advances. After the remission, the pain shortly returns with increased violence. We are not, however, to consider the pain as pathognomonic of the disease, for we sometimes see abdominal pain resembling that in puerperal peritonitis, which afterwards disappears altogether. And in certain cases of undoubted puerperal peritonitis there is no pain, or pain of slight duration. I have seen five or six cases of intense puerperal peritonitis (as shown by dissection) in which there was neither pain nor tenderness. Dr. Ferguson has carefully estimated the frequency of this symptom, and he has found that

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* Essays in Med. Comment., 1791, pp. 311-315.

The number of his patients who had no pain was . .				19
,, ,,	who had pain for	1	day was	51
,, ,,	,,	2	,,	48
,, ,,	,,	3	,,	22
,, ,,	,,	4	,,	18
,, ,,	,,	5	,,	6
,, ,,	,,	7	,,	5
,, ,,	,,	8	,,	4

The pain from the first is accompanied with more or less sensibility of the hypogastrium; this tenderness becomes exquisite as the inflammation extends, and at length the patient cannot bear the slightest pressure; even the weight of the bed-clothes is intolerable, and the tension and pressure of the parietes are avoided, by lying on the back, with the knees drawn up. The enlarged uterus can frequently be felt through the integuments, above the brim of the pelvis, at an early stage of the disease.* Shortly after the disease is established the abdomen becomes tumid and tympanitic, and in some cases, at a more advanced stage, the presence of effusion may be detected. The air which gives rise to the tympanites may be contained either in the intestines or the peritoneal sac.

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* Campbell on Puerperal Fever, p. 33. Lee on Puerperal Fever, p. 21.

The effect of the disease upon the lochial discharge varies; in the majority of cases it continues to flow as usual; in some, the quantity is diminished, and in others it is suppressed.* The secretion of milk is much more uniformly influenced by the attack. If it have commenced before the incursion of the disease, it is suspended, and the mammæ become flaccid; if the disease precede, the secretion is generally prevented. It is remarkable, that a great number of the patients lose all interest in their infants, and even refuse to give them suck.

The pulse is uniformly high throughout the disease, varying from 110 to 140 in a minute, and towards the termination to 160 and upwards. It is generally small and wiry, but is liable to modifications from treatment, and from the peculiar character of the epidemic.†

The tongue is generally coated with a whitish film in the centre, but red around the edges. In some few cases it is dry and brown in the centre, with a yellowish or white fur at the edges. The thirst is considerable at the beginning and towards the termination of the disease, but much less during its height. The stomach is disturbed at a very early period, and the nausea and vomiting continue at intervals throughout the attack. At first, the matter voided is merely the contents of the stomach, mixed with mucus; afterwards bilious matter is ejected; and lastly, green, brown, and black fluids, constituting what is called the "coffee-ground vomit." Mr. Murray found this to consist chiefly of resin, together with mucus, gelatine, phosphate of lime, and muriate of soda in small proportions.‡ In many cases the irritation extends throughout the intestinal canal, and diarrhœa is the result. This, by some, has been held to be a favourable symptom, but by others as an aggravation of the disease; and certainly my own observations would rather incline me to the latter opinion. The dejections vary in character and consistence, becoming very dark and fœtid towards the termination in bad cases.

The urine is generally turbid or high coloured, and somewhat diminished in quantity; and the patient has frequently some difficulty in voiding it. Dr. Hulme observes that "the patient at first often complains of some difficulty in making water, and discharges it in small quantities; but this usually goes off after having a stool or two. The urine, after standing for some time to settle, generally appears of a brown colour, and deposits a crude sediment, half-floating, at the bottom of the glass."*

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* Hey on Puerperal Fever, p. 23. Armstrong on Puerperal Fever, p. 4.

† Hulme on Puerperal Fever, p. 6. Campbell on Puerperal Fever, p. 35.

‡ Campbell on Puerperal Fever, p. 181.

Throughout the course of the disease, the skin is much about the natural heat, and dry, but as a fatal termination approaches, it becomes cold and clammy.

The intellectual faculties are rarely affected. Dr. Gordon, indeed, mentions that delirium was occasionally, but rarely, observed in the epidemic he describes; but in general the patient retains her consciousness and senses until very near the end. The countenance is very much changed; the features are all drawn upwards, and expressive of great anxiety and suffering. A patch of crimson, like a hectic flush, is sometimes observed on one or both cheeks, and is an unfavourable symptom.

Such are the characteristic symptoms as laid down by those who have had most experience in the disease. Its duration will vary according to the virulence of the epidemic: some cases have terminated fatally on the first, second, or third day of the attack; others from the fifth to the tenth. Dr. Denman fixes the general termination on the eleventh day; Mr. Forster, from the fourth to the sixth day; Dr. Leake, the tenth or eleventh day; Dr. Hulme, the seventh or eighth day; Dr. Hamilton, the fifth or sixth day; Dr. Gordon, on the fifth day; Mr. Skey, within a week; and M. Bang, on the sixth day. Dr. Campbell states that the greater number of his patients died on the fifth day; one died on the first; three on the second; three on the third; four on the fourth; seven on the fifth; one on the sixth; two on the seventh; and one on the eighth day;† Dr. Blundell says that it may destroy the patient within twenty-four hours from the commencement of the disease, or that "three or four days, not to say five or six, may be the average duration of the affection."‡ Dr. Collins thus gives the result of his experience: "In fifty-six deaths in the hospital, it proved fatal at the following periods from the date of the seizure, viz., two in twenty-four hours; one in twenty-seven; one in thirty-six; nine on the second day; fifteen on the third; thirteen on the fourth; four on the fifth; five on the sixth; three on the seventh; two on the eighth; and one on the eleventh day."§

MORBID ANATOMY.—The peritoneum may, in some few cases, exhibit no signs of inflammation; but generally it is found more or less vascular, especially that portion of it covering the uterus. Dr. R. Lee has given it as his experience, that "puerperal peritonitis commences in the peritoneal covering of the uterus, and extends from thence with greater or less rapidity, according to the severity of the attack, to the whole peritoneum. In some cases, the inflammation is confined to the uterus, and it is generally most severe in this situation, or in the parts immediately surrounding that organ; even when it has extended to the other viscera, and affected them most severely, the peritoneum of the uterus invariably exhibits signs of recent inflammation. The lymph is, for the most part, thrown out in thicker masses upon the uterus than in any other situation; and this viscus seems always to suffer in the greatest degree. In the cellular membrane, under the peritoneum, serum and pus are also not unfrequently found deposited. The cellular tissue also, which surrounds the vessels of the uterus where they enter and quit the organ, not unfrequently contains some serous or purulent fluid, and the same appearance has been observed in the cellular membrane connecting together the muscular fibres."*

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* On Puerperal Fever, p. 9.

† Ibid., p. 50.

‡ Obstetricy, p. 74.

§ Pract. Treatise on Midwifery, p. 384.

Dr. Collins states, that "in thirty-seven of the fifty-six women who died, the following *post-mortem* appearances were discovered: —the abdomen being ostensibly the seat of the disease, the morbid appearances were chiefly found there; however, in *seven* we observed fluid effused into the thoracic cavities, similar in appearance to that met with in the abdomen. Effusion of fluid, though differing in character and quantity, was invariably found to have taken place. In *twelve*, it seemed to be serum of a straw colour; in *eighteen*, it was sero-purulent, something of the consistence of thick cream; and in *seven* it appeared bloody-serum, with quite a glutinous feel when rubbed between the finger and thumb. In these latter cases, which rapidly proved fatal, there was no lymph whatever found; whereas, in the other varieties, it was usually found deposited in large quantities, particularly in the vicinity of the uterus, but often over the entire surface of the intestines and abdominal serous membrane. In almost every body examined, the peritoneum exhibited great increase of vascularity; nor could we discover in any instance that the inflammation seemed to penetrate deeper than this membrane. The uterus, in a great majority of cases, was quite natural in appearance; in some, it was soft and flabby; and in a few, unhealthy matter was found in its sinuses. The ovaries, in numerous instances, had suffered much in structure from the effects of inflammation;

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* On More Important Diseases of Women, p. 24.

being generally much enlarged, and so softened in texture as to be broken in pieces by the least pressure."*

Thus we find vascularity of the peritoneum and thickening somewhat in proportion to the duration of the disease, a layer of lymph covering the intestines and omentum, and agglutinating them together, effusion of serum, &c., to be the most general effects of this disease. These appearances may be limited to the uterus and pelvic viscera, or they may embrace the entire abdomen; in some rare cases they appear almost confined to the omentum.

The quantity of serum with flocculi of lymph floating in it varies considerably, and I think somewhat in proportion to the duration of the disease. In those cases which rapidly prove fatal, we more frequently find the organs covered with a layer of semi-fluid lymph; but in more prolonged cases, in addition, we find more or less effusion. It does not vary in chemical composition from that in ordinary peritonitis. It may be clear or turbid, of a yellowish-white colour, with shreds of lymph in it, resembling very much the whey produced in making cheese. In some rare cases blood is found in the peritoneal sac, either alone or mixed with the serosity. Puriform matter is also frequently found, especially in the pelvis, around and behind the uterus, where the inflammation has apparently been most intense. It is sometimes contained in a cyst, which is apparently a concretion of the outer surface of the pus.

But the effusion of serum or pus may not be confined to the free surface of the serous membrane merely, but may occur beneath it. In an epidemic which prevailed in Dublin, Dr. Sam. Cusack states that "two kinds of effusion were met with in the cells of those tissues (sub-serous and pelvic cellular tissue), one a reddish serum, occasionally so copious as to pervade not only the cellular tissue about the uterus, the pelvic cavity, and the iliac regions, but even sometimes to distend the cells of the delicate cellular tissue which connects together the two layers of the mesentery. The other species of effusion is not of so fluid a nature, resembling jelly in appearance and consistence. This also occupies the cellular tissue, and is most conspicuous where the looseness of the peritoneum admits of freer effusion. Thus the lax nature of the cellular tissue connecting the layers of the peritoneum, which form the broad ligaments of the uterus, admits of its being poured out in considerable quantities in that situation."†

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* Pract. Treatise on Midwifery, p. 398.

† Edinb. Med. and Surg. Journal, No. 98.

Diagnosis.—1. *From after-pains, or hysteralgia.*—These affections occur soon after delivery, and diminish or disappear by the third or fourth day—about the period when puerperal fever commences. After-pains are accompanied by a perceptible contraction of the uterus, which is absent in puerperal fever. The pulse is sometimes accelerated by after-pains, but is seldom steady in its frequency; in puerperal peritonitis it never falls below its frequency at first, but generally increases. The hypogastric tenderness in after-pains is not great, except during a pain, and it goes on decreasing; whilst in puerperal peritonitis it rapidly increases. The constitutional disturbance is incomparably greater in puerperal peritonitis, and it augments every day; whilst in hysteralgia it diminishes. The sedative, which generally relieves after-pains, has little or no influence upon the pain in puerperal fever. Notwithstanding these distinctions, there are undoubtedly many cases in which the diagnosis is by no means easy at first; and our treatment should be arranged so as to err (if we be in error) on the safe side.

2. *From intestinal irritation.* — This affection frequently assumes many of the characteristics of puerperal fever. There are, however, several points of difference. It is generally accompanied by marked evidences of gastric and intestinal disorder. The tongue is loaded, there is flatulence, nausea, and vomiting, constipation, or diarrhœa. The abdominal pain is diffused, and does not radiate from the uterus, as in puerperal peritonitis; neither is the uterus enlarged, nor tender. The abdomen may be enlarged and tense, if there be much secretion of air; but percussion will at once distinguish it from enlargement by the effusion of serum: it is rarely very tender on pressure, and gentle friction affords relief. It may occur at any period after delivery, and at first may occasion some anxiety from the resemblance of the symptoms to those of puerperal fever; but twenty-four hours will generally clear up the difficulty; the pulse falls, the milk is secreted, the lochia are not unhealthy, and the pain and distress are relieved by medicines. A little inquiry will generally elicit the fact that the bowels had been neglected previous to delivery.*

3. *From ephemeral fever, or weid.*—The commencement of ephemeral fever may excite some alarm, from its resemblance to puerperal fever; but its duration is shorter, its decline rapid, and its constitutional symptoms less severe. There is also far less abdominal irritation, and the breasts continue distended and painful.†

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* Lee on Diseases of Women, p. 22.

† Armstrong on Puerperal Fever, p. 22.

4. *From hysteritis.*—The main distinction is the character and situation of the tenderness; in puerperal peritonitis, the slightest touch on the abdominal parietes causes acute torture; whereas, in hysteritis, the patient can bear pressure very well, until we can feel the enlarged uterus. Any increase of pressure, after the abdominal parietes are in contact with the uterus, gives acute pain.* The symptoms of hysteritis are also more local.

Prognosis. — The general prognosis is unfavourable, even in sporadic cases, but still more so when the disease is epidemic.

Dr. Hulme declares it to be as bad as the plague.

Dr. Leake lost	13	cases out of	19
Dr. W. Hunter	31	„	32
Dr. Clarke	21	„	28
Dr. Gordon	28	„	77
Dr. Campbell	22	„	79
Dr. Armstrong	4	„	44
Dr. Lee	40	„	100
Dr. Collins	56	„	88
Dr. Ferguson	68	„	205

In the epidemic in Paris (1746), in Edinburgh (1773), and in Vienna (1795), none recovered.

Mr. Hey observes, " For some time after the commencement of this fatal malady, it proved fatal in every case that came within my knowledge; and though a few patients recovered under the treatment which my father and I had formerly found successful with puerperal fever, yet the success was very small till the method hereafter described was fully adopted."†

Dr. Ferguson states, "If we take the results of treatment adopted in various puerperal epidemies, by various practitioners, we shall find that on a large scale one in every three will die, with all the resources which medicine at present offers. To save two out of three, then, may be termed good practice in an epidemic season."‡ If the epidemic be as severe as some which have occurred in Dublin it would be very successful practice to save one out of three.

Treatment.—It must be borne in mind, that when any peculiar mode of treatment is advised, the character of the epidemic is the test of its propriety. Forgetfulness of this rule has been the source of much controversy, and no slight acrimony. As Dr. John Clarke remarks, each author takes the epidemic he has witnessed as the type of all, and remorselessly condemns all treatment which does not agree with that which he has found successful. There is no question that the employment of antiphlogistic remedies, by Gordon, Hey, Armstrong, &c., was a great improvement upon the old methods, in the epidemics which they witnessed; but it is not to be taken for granted that it would have answered equally well in the previous ones. For many years past it has been found either inadmissible or injurious in the cases we have had in Dublin. The type of the disease and the state of the patient have not only prohibited the use of the lancet, but have indicated very clearly the necessity of a line of treatment very different, if not the opposite. Thus, in all cases, we must carefully appreciate the general constitution of disease and the special character of the epidemic, as well as the state of the patient, in order to decide upon the most suitable treatment with reasonable probability of success. Moreover, in cases where bleeding is admissible, it has appeared to me that the time for its beneficial use is very limited. After the disease has lasted more than from twelve to twenty-four hours, I have seen but little benefit from bleeding; and the same observation I have heard from Dr. Charles Johnson, of this city, whose opinion is most deservedly of the highest authority.

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* Armstrong on Puerperal Fever, p. 20.

† On Puerperal Fever, p. 10.

‡ Ibid. p. 112.

Having premised thus much, I shall describe the treatment which has ordinarily been found the most efficacious.

If the pulse be firm, a large quantity of blood is advised to be taken from the arm. Dr. Gordon recommends from 20 to 24 ounces, at the beginning, and, if necessary, this may be repeated. The blood generally exhibits the buffy coat. Dr. Ashwell considers Dr. M. Hall's method of placing the patient upright and bleeding to incipient syncope, of great value in puerperal peritonitis.* Should any circumstances forbid a repetition of the venesection, a number of leeches (from 60 to 100, *Campbell*) may be applied to the abdomen, and when they fall off, the abdomen should be fomented, or covered with a light bran poultice. The fomentation, or poultice, may be repeated at intervals, as it has a very soothing effect.

This practice boasts the support of very great names—Denman, Leake, Gordon, Armstrong, Hey, Campbell, Mackintosh, Jos. Clarke, MM. Dugès and Tonnellè, Blundell, Conquest, Gooch, Dewees, Lee, Meigs, &c.; but it was recommended with limitations by Kirkland, Hull, Gardien, Douglas, &c.; and in some epidemics, as I have said, it is either inadmissible or injurious. Dr. Collins remarks, that "In fifteen only of the eighty-eight did we deem it advisable to bleed generally: seven of the fifteen recovered." "I am satisfied, however, that *in hospital*, the immediate application of three or four dozen leeches, followed by the warm bath, in which the patient should remain as long as her strength will bear it, will be found in the great majority the most judicious means of removing blood."*

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* On Parturition, p. 481.

After depletion, the next most powerful remedy is *mercury*, alone or in combination with opium. Without explaining its *modus operandi*, it is sufficient to state the fact, that it has been found to exercise a remarkable influence over inflammation of serous membranes. It may be given in large doses (gr. x. every three or four hours), or in smaller ones, more frequently repeated (gr. ij. every hour); and it should be continued until an impression is made upon the disease, or until the mouth is affected, unless purging be induced. The mouth will be affected much more rapidly, and with smaller doses, if to each be added a very minute quantity of tartar emetic, say $\frac{1}{16}$th of a grain; but this will not do if there be nausea or vomiting. I am indebted to Dr. A. Smith for this suggestion. After a decided effect is produced, the dose may be diminished, and the intervals lengthened. For the purpose of preventing intestinal irritation, it is usual to combine it with Dover's powder of opium. Perhaps it is not too much to say, that the benefit of the opium in this combination is not confined to the prevention of intestinal disturbance, but that it exerts a positive and beneficial influence upon the inflammation. When the calomel acts on the bowels, it may be omitted, and the opium alone continued; and I have seen as much benefit from it alone as from the calomel. Some years ago, I saw a case of puerperal peritonitis, in consultation with a friend, and we administered large doses of opium (gr. j. every hour) with the greatest benefit. Since then, several similar cases have occurred to me. Dr. Stokes was the first to point out the value of opium in bad cases of peritonitis, where bleeding was inadmissible; and I have repeatedly verified his observations.

Mercurial frictions are a valuable mode of affecting the system, and for this purpose I would strongly recommend the Linimentum Hydrargyri of the London Pharmacopœia. But I may say of mercury, as I said of bleeding, that though very efficacious in many cases, there are others in which its effects are injurious, or in which it is inefficacious.

Tartar emetic was recommended by Hulme, and used by several since his time, with apparent benefit. The state of the stomach, in many cases, however, will prevent its exhibition.

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* Pract. Treatise on Midwifery, pp. 391, 393.

Purgatives have been warmly recommended by Hulme, Denman, Gordon, Hey, Armstrong, Chaussier, Stoll; and as strongly reprobated by Baglivi, John Clarke, Cederskioll, Thomas, Campbell. "My own experience," says Dr. Ferguson, "with regard to aperients is, that whenever they create tormina, there is the greatest risk of an attack of metro-peritonitis succeeding. This so constantly occurs, that I invariably mix some anodyne—usually Dover's powder, or hyoscyamus, or hop, with the purgative." If the bowels be constipated, an enema of turpentine and castor oil will be useful. The spontaneous diarrhœa is not always beneficial, but will often need to be restrained by astringents, or opiates.

Emetics were employed before 1782 by English practitioners, and in 1782 they were recommended by Doulcet, of Paris, who relied upon them exclusively, and derived from them extraordinary success. Other practitioners have also used them successfully; but they have failed so often as to have gone out of use, especially in these countries, perhaps in consequence of our mistaking the proper cases. M. Tonnellè states that M. Desormeaux tried them with great success in 1828, but that in the next year they generally failed. In September, 1829, they succeeded, but in October and November they failed. They did not, however, appear to produce any aggravation of the symptoms. Dr. Ferguson remarks, that "the practical question, then, is, what are the cases in which the remedy is applicable? The clue has been already given, I imagine, by Doulcet himself; it is when the violence of the malady has fallen on the liver especially, and when there is early nausea and spontaneous vomiting."*

In the year 1814, Dr. Brennan, of Dublin, proposed the internal use of *turpentine*, which he regarded as a specific, and which in many cases was very successful. He gave it in doses of a tablespoonful at a time, in a little water, sweetened. Drs. Douglas,† J. A. Johnson, Dewees, Payne,‡ Kinneir, Blundell, and Waller, have found it more or less useful. Drs. Jos. Clarke, and other practitioners, tried it, but without success. Dr. Clarke observes, "In addition to the usual routine of practice, numerous trials were made with the rectified oil of turpentine, in doses from six to eight drachms; sometimes in plain water, sometimes combined with an equal quantity of castor oil. The first few doses were generally agreeable to the patient, and seemed to alleviate the pain. By a few repetitions it became extremely nauseous, and several patients declared that they would rather die than repeat the dose. In more than twenty trials of this kind, not a single patient recovered."* It is certainly beneficial when the intestines are tympanitic, especially in the form of enema, and as a counter-irritant to the abdomen; but I have never seen it exert any remarkable influence upon the disease.

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* On Puerperal Fever, p. 204.

† Dublin Hosp. Reports, vol. iii.

‡ Ed. Med. and Surg. Journal, vol. xxii. p. 53.

At an advanced state of the disease, *blisters* are very useful. They may be applied to any part, or the whole of the abdomen, and dressed with mercurial ointment.

Recolin, Dance, and Tonnellè have recommended injections of warm water into the vagina or uterus, three and four times a day. Drs. Lee and Campbell have tried them in a few cases with decided advantage. I have frequently syringed the vagina with warm water with benefit; but I never threw the injections into the uterus.

Hip baths have been found useful by Desormeaux and Collins; but the pain of moving the patient is an insurmountable obstacle to their frequent use.

Loeffler, and Ceely of Aylesbury, have seen good effects result from the application of cold to the abdomen.

The irritation of the stomach may be allayed by effervescing draughts, containing a few drops of laudanum, or by a few grains of the subcarbonate of potash, dissolved in aq. menth. virid.

A selection of these remedies will afford a tolerably good chance to the patient, if we are called early; but in many instances we shall fail, either in cutting short the disease, or in curing it ultimately. It is of the greatest importance, however, that all the means at our command should be tried perseveringly, and that our forebodings should not be allowed to diminish our exertions.

II. PUERPERAL HYSTERITIS.—Inflammation affecting the proper tissue of the uterus has been frequently described. It is mentioned by Astruc, Vigarous, and Primrose. Pouteau observed it in the epidemic of 1750. Ricker and Boër have described it under the term *Putrescirung* or *Putrescenz der Gebärmutter*, and cases of it have been recorded by Smith, Danyau,† and Tonnellè.‡ In certain epidemics it is tolerably frequent, occurring either alone or as one among other local affections. Thus, Tonnellè, in 222 fatal cases of puerperal fever, found 79 cases of simple metritis, 29 of superficial softening, and 20 of deep softening. M. Dugès found the uterus affected in 3 cases out of 4; and Dr. R. Lee states, that in 45 dissections, the muscular coat of the womb was softened in 10 cases.

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* Letter to Dr. Armstrong.

† Repertoire Gén. d'Anatomie, vol. v. p. 1.

‡ Essai sur la Metrite Gangreneuse, 1829.

This form of the disease may be the only affection in certain cases of puerperal fever, or it may be the most prominent, though not the sole affection, or it may only be one of several forms of local disease.

SYMPTOMS.—These will vary somewhat according to the character of the epidemic, and a great deal according to the severity of the attack. In the *milder form*, where the disease does not proceed so far as to disorganize the uterine tissue, I have generally found it commence, on the third or fourth day, with rigors, followed by heat of skin, thirst, and headache. The pulse rises to 100 or 110; the tongue is dry and furred; the countenance expressive of suffering, but without the anxious, pinched, drawn-up character we find in puerperal peritonitis. The patient complains of uneasiness, pain and tenderness in the uterine region, and upon examination we find the uterus more or less enlarged, hard, and tender. The abdomen, at first, is soft and without any tenderness, which is first felt when we perceive that we are making pressure upon the enlarged uterus. As the disease advances, the abdomen often becomes tympanitic, and in some cases the inflammation extends to the peritoneum.

The state of the lochia is by no means uniform; in many cases they are diminished or suppressed; in others, their character is changed, and they become offensive; in other cases, again, they are quite unaltered. The secretion of milk is generally arrested. There is occasionally another symptom, which I think is more marked in hysteritis than in any other variety of puerperal fever, viz., dysuria, which causes much distress, and which may amount to retention, and this especially, as Dr. Dewees has remarked, in cases which have required instrumental aid.

The *severer form* of hysteritis, as described by Dr. R. Lee and M. Tonnellè, is ushered in by rigors, followed by increase of heat and headache. There is occasionally delirium, and other evidences of cerebral disturbance. The countenance is pallid, anxious, and disturbed; the skin, at first hot and dry, becomes cold, with sometimes a blue or yellowish tinge. The respiration is hurried, the pulse rapid and feeble, with great prostration of strength. The tongue soon becomes foul, and the lips and teeth covered with sordes. More or less of nausea, vomiting, and diarrhœa are generally present. The patient complains of pain at the hypogastrium, where the enlarged uterus may be felt, and which is very tender on pressure. The lochia are diminished, or altogether suppressed, and frequently they become fœtid or acrid.

This form presents a very different aspect to the former. It is quite evident, that in addition to the local affection common to both, the constitution is deeply involved, either in consequence of its previously impaired condition, or owing to some peculiarity of the epidemic, or in consequence of the local disease having produced a more rapid and profound impression on the general system.

Hysteritis may terminate—1. In *resolution:* as is the case with the mild variety which I have described, and in which there is a gradual subsidence of the symptoms.

2. In *abscess:* which may open into the uterine cavity, or into the peritoneal sac. I had an opportunity of seeing a case of the latter kind, some time ago, in a patient whose case has been published by my friend Dr. Beatty.

3. In *softening.* This termination was observed 49 times by M. Tonnellè, and 10 times by Dr. R. Lee. "Among the 222 fatal cases of puerperal fever observed by M. Tonnellè in the Maternité at Paris, in 1829, there were 49 in which the muscular tissue was found softened. M. Tonnellè states, that softening of the uterus, after showing itself frequently in the first half of the year 1829, and particularly about January, disappeared entirely in the months of July and August, which were characterized in a remarkable manner by the frequency of inflammation of the veins. Afterwards, it began to rage anew with great violence in September and October, and again disappeared in the last two months, during which time the mortality was inconsiderable."*

4. In *gangrene.* This has been described by M. Boër, in his valuable work,† and by Ricker,‡ and noticed by Siebold, Busch, Boivin and Dugès, Danyau, &c.

Morbid Anatomy.—The peritoneal coat of the uterus very often exhibits marks of inflammation. It may be vascular, and coated with lymph, or softened. The size of the womb is manifestly increased, and its substance soft and flabby. Small collections of purulent matter are sometimes found in its parietes, which in these spots exhibit various degrees of absorption. Boivin and Dugès observe that "pus is sometimes found even in the substance, and generally nearer to the exterior surface than the interior; thus pus collects into distinct abscesses, from one to five inches in diameter, sometimes into a simple or multilocular deposit, with a greenish or viscous appearance; at other times it is infiltrated into the fleshy fibres, imparting to them a yellow reddish colour, perceptible through the peritoneum. In this latter case tumours form, which are sometimes hard and projecting, upon the fundus uteri; at other times flattened, soft, and broad; these latter come further down towards the lateral parts, and often form a continuation, together with purulent infiltrations, between the laminæ of the broad ligaments with the cellular tissue of the pelvis and the substance of the ligament of the ovarian vessels, frequently giving rise to those large abscesses of which we have already spoken."* The substance of the uterus may be, in patches, reduced to a mere pulp, of a dark purple, yellowish, or greyish colour, and occasionally of a bad odour. This softening generally commences at the inner membrane, and penetrates more or less through the substance of the uterus. According to Dr. Ferguson's experience, "The point of insertion of the placenta is the most ordinary seat of all uterine lesion, whether of abscess, softening, or phlebitis; the next point, the large and congested, lead-coloured cervix uteri." False membranes of coagulable lymph are found on the lining membrane of the cavity, mixed with blood and lochia.

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* Lee on More Important Diseases of Women, p. 38.

† Natürliche Geburtshülfe, &c., vol. i. p. 202.

‡ Siebold's Journal, vol. ii. p. 62.

M. Tonnellè states that the disease in Paris exhibited two distinct forms, "the softening of the uterus, properly so called, and the putrescence. In the first form, the softening affected only the internal membrane of the uterus, and it presented itself under the appearance of irregular superficial patches, of a red or brown colour, which occupied almost all the points of this surface; its limits were not determined, the diseased tissue passing by irregular gradations or shades into the healthy tissue. In the second species the softening extended deep into the substance of the uterus. The tissue of this organ was so softened that the fingers could not seize it without passing through it in all parts. The superficial softening was combined almost always with some alteration of structure—peritonitis, metritis, or uterine phlebitis; and it did not appear to M. Tonnellè that the existence of these had a very sensible influence on the progress of the symptoms. The softening in the second degree was also sometimes combined with other disorders; but it formed usually the principal alteration, often the only one, and invariably impressed upon the disease the most decided typhoid character."† MM. Boivin and Dugès,‡ and M. Duplay, have noticed similar changes, and the latter author especially has accurately described the circumscribed mortification found on the internal surface of the uterus. The *cause* of this peculiar softening has been much debated, some attributing it to a specific action of the parts, or to alteration of the blood, and others to inflammation; in some cases it appears to be the result of inflammation, but in others there is no evidence of previous or concurrent inflammatory action.

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* Boivin and Dugès, Diseases of the Uterus, &c., trans., p. 326.

† Lee on Diseases of Women, p. 38.

‡ Diseases of the Uterus, &c., trans., p. 325.

Diagnosis.—When complicated with peritonitis, the diagnosis is very difficult; but when the uterus is alone affected, it is easier to distinguish it:—

1. From *after-pains, weid*, &c., it differs very widely in its persistence, and in the gravity of the accompanying constitutional symptoms.

2. From *puerperal peritonitis*. The most marked distinction between them is the tenderness on pressure, which, when the peritoneal sac is inflamed, is general and superficial, rendering the slightest pressure intolerable; whereas, in hysteritis, the abdomen will bear pressure very well all over, *until we ourselves feel that we are pressing the enlarged and hardened uterus.* The only exceptions to this rule I have met with are those cases of peritonitis where there is no abdominal tenderness. The pulse in hysteritis is weaker, and the patient sinks more rapidly than in peritonitis, the lochia are more frequently fœtid, and the entire symptoms have a more marked typhoid character in the severer form.

Prognosis.—In the milder form many cases recover; the uterus remains hard and tender for some time, but the pain and tenderness diminish, the pulse becomes quieter, the tongue clean, the bowels regular, and the appetite returns. The preservation or re-appearance of the natural character and smell in the lochia is a valuable sign, and a still better is the continuance of a good secretion of milk.

In the severer form, especially when it prevails epidemically, the prognosis is very unfavourable, almost every well-marked case proving fatal, and the patient dying with symptoms of a bad typhoid character.

Treatment.—The reader will bear in mind the observations I have already made as to the modification of treatment required by the general constitution of disease at any given period, the peculiar type of the prevailing epidemic, and the state of the patient. As a general rule, I think patients bear bloodletting better in the mild form of hysteritis than in some of the other varieties, but even here I have not been able to use the lancet of late years. Venesection, however, may be necessary and proper, and the earlier in the disease we have recourse to it the better.

If inadmissible from any cause, we shall, I think, always derive advantage from leeches applied over the uterus, followed by constant poultices and fomentations.

Calomel and opium are of great value when they act kindly. I have rarely seen a patient die who was fairly under their influence, but it frequently happens that diarrhœa is induced, and then we must omit the calomel, or give it in very small doses, and apply mercurial frictions, with opium given internally.

When the acute stage is over, very great benefit will be derived from repeated blisters to the abdomen, and by covering it with a layer of prepared cotton wool. The bowels must be kept free, but by the gentlest means, active purging seeming to aggravate the symptoms; and at all events it is an obstacle to the use of mercury.

No remedy that has been tried seems to have much power over the severer form when it prevails epidemically. If antiphlogistics are admissible at all, which I very much doubt, it must be in the earliest stage, but I should have more faith in counter-irritation and the liberal exhibition of tonics, such as bark, with wine, and, if necessary, opium, just as they are given in typhus fever.

III. INFLAMMATION OF THE UTERINE APPENDAGES.—Under this head is included inflammation of the serous membrane, and proper tissue of the ovaries, fallopian tubes, and broad ligaments. It is not always possible to separate these affections from inflammation of the peritoneal cavity, with which they are so often conjoined; but there are cases in which they exist alone, or predominate in a striking manner, or where the consequences of the disease continue longer in these parts. Puzos has described such cases by the term, "*Dépôts laiteaux dans l'hypogastre,*" and Levret, as "*Engorgemens laiteaux dans le bassin.*" The observations of MM. Husson and Dance likewise prove that this is a frequent, and often fatal, termination of inflammation of the peritoneal coat of the uterus and its appendages. M. Tonnellè found fifty-eight cases of inflammation of the ovary and four of abscess, out of one hundred and ninety cases of puerperal fever.

SYMPTOMS.—As inflammation of the uterine appendages is generally combined with more or less inflammation of the peritoneal cavity, the symptoms will present many of the characters of peritonitis, but probably in a moderate degree; and as they subside, or as the local affection becomes more developed, we shall detect mischief in the situation of these appendages. The pain is less acute and less universal than in general peritonitis: it is seated in one of the iliac fossæ or the lateral portion of the hypogastrium, from whence it may radiate to the groin and down the thigh. A careful examination will detect a degree of hardness in the part, compared with the rest of the abdomen, perhaps a definite swelling with great tenderness on pressure. Percussion, which probably yields a clear sound over the abdomen generally, gives a very dull sound over this portion.

An *internal* examination will often throw light upon the seat of the disease: the vagina will be found hot and painful at its upper part, and the tumefaction may be detected through its lateral parietes.

The disease generally commences with rigors, thirst, headache, quick pulse, &c., presenting an array of constitutional symptoms very similar to those in peritonitis, which, therefore, I need not repeat. If the disease be extensive, there is generally observed much exhaustion following the first stage, and the attack may prove quickly fatal.

Should the disease not prove fatal, the attack may terminate—

1. In *resolution*, without the organs being seriously injured; or in some cases adhesions may be formed between continuous portions of the serous membrane, which, though for the present innocuous, may be injurious subsequently. Boivin and Dugès relate a case in which anteversion was caused by these adhesions. If the fallopian tubes have been involved, the cavity of one or both may be obliterated, or they may become adherent to some neighbouring part, so as to prevent altogether their ordinary functions.

2. *In suppuration.*—Matter may form in either ovary or broad ligament, or a more extensive pelvic abscess may be formed, including these organs and the neighbouring tissue. The matter may escape into the peritoneum, and excite fatal inflammation; but this is comparatively rare, or the abscess may open into the bladder, vagina, or rectum, or make its way to the surface of the abdominal parietes. Many examples of each are on record, and I have myself seen most of them, but in my experience the opening has most frequently been into the rectum.

MORBID ANATOMY.—In some cases we find, on dissection, that the disease has been confined to the serous membranes, presenting similar phenomena to those already noticed—thickening, effusion of lymph or serum, &c. The broad ligaments, fallopian tubes, and ovaria, are red and vascular; the morsus diaboli is of a vivid red colour, and sometimes softened, and in its cavity, or under the peritoneum, deposits of pus may be discovered. Dr.

John Clarke states that "inflammation is often observed running along the fallopian tubes, which, when cut open, will be seen loaded with blood. The ovaria, too, are often affected in the same way. Pus is often found in the cavity of the fallopian tubes, and also in the substance of the ovaria, which are in some cases distended by inflammation and matter, so as to equal in bulk a pigeon's egg."* Effusion of serum or purulent matter may also be found between the folds of the broad ligaments.

The ovaria may be imbedded in lymph, the product of inflammation of their serous coat. Sometimes they are swollen, red, and pulpy. One or both of these organs may be affected.† Dr. Gordon mentions that in his cases of puerperal, the right ovary was always diseased, and the left healthy. Upon laying open the ovaries, their structure will be found more or less diseased. There is a great increase of vascularity, and frequently a softening of their proper tissue. In a few cases it is utterly disorganized. Blood is sometimes effused into the Graafian vesicles, so as to destroy their texture. Pus may be found in small masses throughout the ovary, or that organ may be reduced to a sac full of purulent matter, which may escape in different ways, as already noticed.‡

DIAGNOSIS.—The situation of the pain and tenderness, the dulness on percussion, the slight increase of hardness, and the results of an internal examination, are the only grounds of diagnosis during the earlier acute stage. If, however, the disease continue, and do not terminate in resolution, these symptoms become more marked, and we cannot easily make a mistake as to its nature and seat.

TREATMENT.—In some cases venesection may be necessary, but more commonly leeches to the part will be sufficient; they should be in sufficient numbers, and may be repeated if necessary. After the leeches fall off, a poultice hot, soft, and sloppy, should be constantly applied, not merely to encourage the bleeding, but for its soothing effect upon the inflamed parts.

Calomel and opium may be given to a moderate extent, if the bowels are not irritable during the acute stage. Vaginal injections of warm water, two or three times a-day, and hip-baths occasionally, will be found very soothing and grateful.

If the disease persist, and matter form, it must be treated in the way I shall presently describe.

The foregoing description applies to those cases which occur as a variety of puerperal fever, in connexion, it may be, with other local affections, and during an epidemic: but inflammation and abscess may occur after delivery, independent of an epidemic, and with no other complication: nay, it may happen to married women who have had no children, and even to virgins. I hope the reader will pardon the irregularity, if, in order to complete the subject, I introduce here a brief summary of the peculiarities of the disease in its more isolated and chronic form.

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* Essays, p. 63.
† Ferguson on Puerperal Fever, p. 38.
‡ Lee on Diseases of Women, p. 26.

As I have just observed, this species of inflammation of the uterine appendages may occur, though rarely, independently of pregnancy and labour, but far more frequently after labour, and at varying intervals; the first intimations being perceived in some cases from three to ten days after delivery, and in others not until the lapse of some weeks.

Causes.—It is very difficult to assign any special cause for this attack. It may follow blows, falls, or a fright; but it is more frequently the result of cold or of excessive sexual intercourse. From the coincident suppression of the milk or lochia, it has been frequently attributed to either accident, but, as I believe, without sufficient grounds. That it may occur in consequence of the long-continued pressure of the child's head in lingering labour, I do not doubt; but it is evident that this is not a frequent cause, as most of the cases I have seen occurred after natural labour. Lastly, it may be the termination of a more general acute inflammation.

Invasion.—The mode of invasion varies a good deal:—

1. In certain cases there are few, if any, preliminary symptoms: uneasiness, perhaps, but not amounting to pain, in one or other iliac region, and upon placing the hand on the spot, a tumour is detected.

2. Or, after a favourable convalescence for some days, just as the usual term of our attendance expires, the patient experiences a slight febrile attack, with some shooting pains in the abdomen, which subside after a time, though the fever continues without apparent cause, until, in the course of time, the local disease develops itself.

3. Again, in other cases, the attack is purely local and its nature pretty evident; from the beginning there is pain in one or other iliac region, tenderness, and shortly after, tumefaction, with fever.

4. Lastly, the affection may at first assume the character of a more general affection of the peritoneum, the pain extending over the abdomen, occurring mainly in paroxysms, with tenderness on pressure, and fever; but by-and-by, the general tenderness and

extended pain subside, and become, as it were, localized, by which the character of the attack is made evident.

SYMPTOMS.—Having thus briefly alluded to the various modes in which the disease commences, I prefer taking the symptoms separately, in the order of their importance and prevalence, rather than in that of their succession.

1. The presence of tumefaction or of a distinct tumour, is invariable; it occurs in all cases, and characterizes the disease. It may be found completely above Poupart's ligament, and the linea ilio-pectinea, sometimes occupying one iliac fossa entirely, and even extending upwards as high as the umbilicus, and forwards to the linea alba; or it may be situated more deeply in the pelvis, just reaching to Poupart's ligaments, protruding the groin, and from its fixedness giving the impression of being firmly connected with these parts. In the former case, the tumour is larger, more defined, and far more movable: in the latter, it is rather undefined, immovable, and more painful. In both it is equally hard; in fact, as hard as a stone until suppuration commences; and equally tender on pressure. If a vaginal examination be made in the former case, we do not always discover any change; the vagina may be cool, no tumefaction may be detected, and movement of the uterus may occasion little pain. But in the latter cases, and also in the former when the inflammation is much diffused, the vagina is hot, somewhat tender, and at one of its sides, or at its upper part in the "*cul de sac*," on one side of the cervix uteri, a hard, painful swelling may be detected, which is evidently connected with the tumour in the groin, and in these cases the uterus cannot be moved without acute pain.

2. Although the period at which it may be developed varies, yet sooner or later pain is an accompaniment of the disease. It maintains, as it were, its seat in the tumour, from whence stings of pain radiate in all directions. When the tumour is high, that is, above the brim of the pelvis, the pain is more limited to the tumour: when situated in the pelvis and groin, it extends across that cavity, down to the anus, to the back, and down the thigh. In these cases it is almost always difficult, in some cases quite impossible, to straighten the thigh, so as to stand upright. Walking, too, is both difficult and painful.

3. In these latter cases, also, when the tumour occupies a portion of the pelvic cavity, we often find the patient distressed by tenesmus, and a desire to make water, the consequence, probably, of an extension of the irritation to the bladder and rectum. Occasionally, when the tumour is large, it offers a mechanical im-

pediment to the functions of these viscera, and the patient may suffer from dysuria, or be unable to evacuate the intestinal canal.

4. The amount of fever, as well as the time of its setting in, varies. In some cases it precedes or accompanies the first local symptoms; in others, it supervenes after the tumour has been detected some time. In a few cases it is almost confined to the evening, and during the process of suppuration there are, in almost all cases, evening exacerbations. The pulse ranges from 90 to 110; the tongue is loaded, the skin hot, the thirst considerable, and the urine high coloured. The appetite is always bad. These symptoms are somewhat mitigated, or at least the patient suffers less, in cases not connected with parturition.

TERMINATIONS.—After being fully developed, and running on even for a considerable time, the disease may terminate:

1. *In resolution.*—This most frequently occurs with cases in which the tumour is above the brim, and limited in extent; and in such, we find the pain diminishing and ultimately ceasing, the tumour first becoming less tender, then less in size, until at length it disappears. This process will occupy from one to three months.

2. *In abscess.*—When suppuration takes place we can generally feel a degree of softening, with an obscure sense of fluctuation in the tumour, either externally or internally; the patient complains of more throbbing, and occasionally of rigors, and by degrees (if not anticipated) the coverings are thinned, and the matter may escape—

a. Externally, through the abdominal parietes covering the tumour.

b. Into the vagina, through which the matter escapes.

c. Into the intestinal canal, and especially the rectum, with the evacuation of matter by stool.

d. Into the bladder.

e. Into the peritoneum, where it gives rise to peritonitis, always alarming, but not always fatal.

f. Into the surrounding cellular tissue, where it may burrow until it finds an outlet.

The matter may be evacuated by any of these "routes;" and if the opening be sufficiently large, the sac may be emptied, and the abscess fill up and heal. But if the opening be small, the discharge may continue for an indefinite length of time, the opening remaining fistulous, and the cure being proportionably difficult. I have repeatedly seen the matter evacuated by the first three ways, and I think equally frequently. I have also seen it pass into the bladder, but very rarely. I have never yet seen it evacuated into the peritoneal cavity, and I cannot but think it very rare.

3. The extent of the disease, or the secondary affections caused by it, may prove fatal after an indefinite length of time.

Diagnosis.—A good deal of light will be thrown upon the diagnosis, when the disease occurs within a reasonable time after parturition, and especially when the patient has suffered from abdominal pain: in such cases, if we discover a tumour in one of the iliac fossæ, with tenderness and pain, we shall have adequate grounds for diagnosticating this affection.

If, however, the attack occur independently of child-bearing, or at a considerable interval afterwards, there may be difficulty in distinguishing between it and some of the chronic organic diseases of the ovary, especially when the tumour is above the pelvic brim: our safest guide, probably, will be the amount of pain and constitutional disturbance, which is much greater in the disease I have been describing.

An ilio-cœcal abscess when situated rather lower than usual may easily be confounded with an ordinary pelvic abscess, which is the more undesirable as, if we attempt to open it, we may penetrate into the intestine. I have seen one such case, and the only ground of differential diagnosis I could make out was an unusual resonance of the tumour on percussion, which I believe never exists with pelvic abscess.

I have known this affection mistaken for sciatica; and when the tumefaction is mainly confined to the pelvis, and pressure is made upon the nerves issuing from that cavity, the pain may be limited to the track of the nerves, so as to deceive any but a careful observer. However, a minute investigation will probably enable us to trace the pain into the pelvis, and then an external, and especially an internal, examination will at once reveal the cause of the pain. The flexion of the thigh, which alone might also mislead, will of itself lead to an examination of the groin, and so to the detection of the tumour.

Treatment.—The indications of cure are, 1, to procure resolution of the tumefaction; or, 2, to promote suppuration and evacuation of the matter.

1. If we are called in at an early period of the attack, it is often possible to arrest its progress, as has been well remarked by Dr. Doherty; nay, even where the disease has lasted some time, as in the cases mentioned by Puzos, it is in some cases quite possible to procure resolution. For this purpose Mauriceau, and the author just named, advise repeated venesection, with purgatives, alteratives, absorbents, &c. I believe that the repeated appli-

cation of leeches will be found more effectual at less expense of strength. A dozen should be applied over the tumour, followed by bran poultices, and repeated if necessary, *i.e.*, if the pain and throbbing be not relieved. If we succeed in arresting the progress of the inflammation, a succession of small blisters will be of great use. Fomentations, and an occasional hip-bath, also afford great relief to the patient; but still more comfort is derived from vaginal injections of warm water, twice a day.

Internally, we may exhibit mercury in small doses, perhaps even so far as to affect the gums, though this is not generally necessary, and an occasional purgative; but my experience has led me to the conclusion that brisk purgation is not beneficial; it appears to augment the local irritation, and certainly increases the pain. If the pain prevent sleep, an opiate may be given. When the disease shows signs of retrocession, I have seen benefit derived from an application of the emplastrum hydrargyri. The diet should be nutritious, but bland and unstimulating.

2. If, however, notwithstanding the prompt and sedulous use of the means I have indicated, the disease should not yield, we may be sure that suppuration will take place, and our object will then be to promote this by poultices and fomentations, constantly applied.

The formation of matter will sometimes be indicated by rigors, but in many cases it is by the touch only that we can recognise this occurrence. I cannot too strongly impress upon my readers the advantage of making an opening into the abscess when it is possible, and so deciding the course which the matter is to take, instead of leaving it to burrow and make an opening in some dangerous situation. The best situation for our incision, if the case admit of it, is through the abdominal parietes; the next, through the wall of the vagina. If, from the high situation of the tumour, we fear that, when opened, the matter may escape into the peritoneal cavity, we might adopt the method so successfully practised in abscess of the liver by the late Dr. Graves, and cut down to, but not through, the peritoneum, and then apply poultices, with little doubt but that the matter will ultimately make its appearance through the wound. Should the abscess open spontaneously, we must counteract, as well as we can, any unpleasant consequences which may result; but, whether opened spontaneously or by the knife, we must endeavour to empty the sac, and to secure a free exit for the matter as it is secreted, by which means we shall avoid the prolongation of the disease, and all the distress of a fistulous opening. When the abscess points into the vagina, it is sometimes difficult to tell whether it has opened or not, from the small size of the orifice, and in such cases the microscope may be of great use. Very lately I was able to decide that an abscess had broken and commenced discharging, by the presence of pus corpuscles in the vaginal discharge. When the matter has been fairly evacuated, the diet must be generous, and a full share of wine or porter allowed.

IV. INFLAMMATION OF THE VEINS OF THE UTERUS, OR UTERINE PHLEBITIS.—This form of the disease has been frequently noticed by more modern authors; amongst others, by Dr. John Clarke, Waller, Meckel, Louis, Dance, Tonnellè, Lee, Boivin and Dugès, Ferguson, &c., and in a series of papers on Metroperitonite, by M. Nonat.* Nor is it very rare; for M. Tonnellè found pus in the veins in 93 cases; and in the thoracic duct in 3 cases out of 134; and Dr. Robert Lee, in 45 cases, had 24 of uterine phlebitis.

CAUSES.—Dr. Robert Lee considers that it may be the result of mechanical injury to the uterus, either during the labour, or by the force used to extract the placenta. "Uterine phlebitis," he says, "appears to result from the mechanical injury inflicted upon the uterus by protracted labour; from the force required for the extraction of the placenta in uterine hæmorrhage; from retained portions of the placenta undergoing decomposition in the uterus; the application of cold, and, perhaps, contagion; or from any of the causes which produce the other varieties of uterine inflammation. M. Dance considers deranged states of the lochia to be a frequent cause of the disease; but these are consequences, and not causes, of uterine phlebitis.† It may follow after hæmorrhage, or arise from cold, or the decomposition of retained portions of the placenta. It may be excited by any of the causes of the other varieties of puerperal fever. Dr. Bartsch observes, "As to the *causes* under which uterine phlebitis was developed, we found it occurring most frequently—1. In women who approached the critical age of life, especially if they were primiparous. 2. In women affected with varicose tumours of the thigh, and external genital organs. 3. In females who, during pregnancy, were submitted to the influence of depressing passions—fear of exposure, jealousy, sorrow, &c. 4. In individuals who, from the symptoms they presented, had frequently employed abortive remedies. 5. From mechanical injury of the uterus during pregnancy, especially if it were followed by abortion. 6. In females subject to chronic disease, as cough, difficult menstruation, hæmorrhoids, fluor albus, chronic diarrhœa, and constitutional syphilis. 7. After flooding during or after delivery, especially from placenta prævia, after difficult labours, after obstetrical operations, especially those requiring the introduction of the hand into the uterus. 8. Finally, the greater number of cases occurred in the months of February, March, April, and May, in females who, the year before, had been attacked by 'la grippe.'"*

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* Revue Méd. Franç. et Etrang., 1837.
† Diseases of Women, p. 54.

SYMPTOMS.—In women of previous good health, the attack commences generally in twenty-four or thirty-six hours after delivery. The patient complains of pain in the uterus, more or less acute, preceded, accompanied, or followed by rigors. The uterus is tender on pressure, and the lochia and milk are both suppressed. There is headache, and slight incoherence; a sense of general uneasiness, and sometimes nausea and vomiting, with acceleration of the pulse. After a time, these symptoms are succeeded by increased heat of surface, tremors of the muscles of the face and extremities, rigors, great thirst, dry brown tongue, frequent vomiting of green fluid, rapid full pulse, hurried respiration, &c. The head becomes more involved, and we find the patient in a state of drowsy insensibility, or violent delirium and agitation, followed by extreme exhaustion. The surface of the body assumes a deep sallow or yellow colour; and occasionally petechial or vesicular eruptions have been observed on different parts of the body. The pain may or may not increase, but the uterine tenderness is certainly augmented, and the abdomen is often swollen and tympanitic. In some very rare cases, there is little or no local distress, and the existence of the disease could not be discovered except for the secondary affections. Such was the case with a patient under my care. She had no uterine pain or disturbance, no tenderness on pressure; and yet, on the seventh day after delivery, a smart febrile attack preceded the formation of a large abscess near the left elbow-joint: after which, a second followed, on the top of the shoulder, and a third in the right arm, above the elbow.

The patient may die during the acute stage, but the majority live longer, and exhibit the most interesting phenomena, connected with this variety of puerperal fever, and distinguishing it from all others. I allude to the *secondary diseases of other organs.*

The *brain,* though often functionally disturbed (135 in 304, *Lee and Ferguson*), is not frequently the seat of organic disease. Its vessels are sometimes congested, and lymph diffused in the pia mater, or serum into the ventricles. According to M. Dugès, there is arachnitis once in 266 cases. Portions of the brain are occasionally softened and disorganized; or there is purulent infiltration into the cerebral substance.

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* Report in Lancet, April 16, 1836.

In the *chest*, we find evidences of inflammation of the pleuræ, effusion of serum of the same character as that in the peritoneal sac, and occasionally effusion of blood.

M. Tonnellè found pleurisy	in 29 cases.
effusion of serum .	in 8 ,,
effusion of blood .	in 6 ,,

The *lungs* are often greatly condensed, of a dark red colour, with infiltration of purulent matter; or they may be in a state of "complete dissolution, having all the characteristics of gangrene, except in many cases its peculiar fœtor."

M. Tonnellè found pneumonia . .	in 10 cases.
tubercles . . .	in 4 ,,
abscess	in 8 ,,
gangrene . . .	in 3 ,,
pulmonary apoplexy	in 2 ,,

The symptoms of the secondary affection in these cases (cough, dyspnœa, &c.) are but slight, and are completely masked by the more serious primary disease. Dr. Robert Lee observes,* "In four cases which have fallen under my observation, where there had been only obscure pain during life, with slight cough and dyspnœa, copious effusion of lymph and serum was found within the cavities of the thorax; the pleura was covered with false membranes, and portions of the lungs had fallen into a state of complete gangrene. In one individual, the pleura bad given way by sloughing; and the right side of the chest was found distended with air. Gangrene, also, sometimes takes place rapidly in those parts of the body on which the patient rests; and the same process is established in other soft parts, where no pressure has been made. In a case related by Cruveilhier, which did not prove fatal, the nose became black and gangrenous."

The *heart* is often enlarged, softened, and friable; its inner membrane deeply stained; lymph and serum are also occasionally found in the pericardium. There are white patches on the outer covering of the heart. I have never remarked any peculiar disorganization of the great arteries; they are often intensely stained.

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* Diseases of Women, p. 49.

The *intestinal canal* is not frequently the seat of organic change. The mucous membrane of the stomach is sometimes inflamed, softened, and occasionally its coats are perforated, giving rise to peritonitis. "Dugès has remarked, that the brown viscid matter exuding from the perforated portion of the stomach, seems to act on the neighbouring organs like a caustic—adding, as proof of this surmise, the fact of his finding a continuous series of perforations of the diaphragm, mediastinum, œsophagus, and lungs, all in the immediate vicinity of a perforation of the large extremity of the stomach."* Between the mucous and muscular tissues, there is an effusion of clear reddish serum, when the vomiting has been excessive. The mucous membranes of the intestines, also, may be softened, and the walls of the canal perforated.

M. Tonnellè found	gastro-enteritis . . .	in 1 case.
	enteritis	in 4 cases.
	entero-colitis	in 1 case.
	the stomach softened .	in 8 cases.
	the stomach ulcerated .	in 5 ,,
	the stomach perforated	in 5 ,,

The *liver* is occasionally diseased: its substance may be congested, softened, or contain abscesses. M. Tonnellè met three cases of abscess in the liver.

The structure of the *spleen* may be softened and disorganized. M. Tonnellè relates two cases of abscess.

The *kidneys* present inflammation of their peritoneal coat, depositions of pus, and flakes of lymph, alterations in their veins, softening, and great engorgement; both kidneys are rarely attacked at once. The ureters and bladder are more often the seat of pain and congestion, than of disorganized structure.

The *eyes* are also affected. The conjunctiva becomes inflamed, the eyelids swollen, lymph is effused into the anterior chamber, and the sight is destroyed. Cases of this kind are related by Dr. M. Hall and Mr. Higginbottom, although not by them attributed to uterine phlebitis.† Dr. R. Lee states, that "in two cases which came under his care, the conjunctivæ of both eyes, without much pain, suddenly became intensely red; the cornea opaque, and the eyelids much swollen, and under their lining membrane a large serous deposition took place; lymph and pus were also effused into the anterior chamber, and in one the cornea ultimately burst."‡ A case of the secondary affection of the eyes is related by Drs. Hardy and M'Clintock.§

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[*] Ferguson on Puerperal Fever, p. 36.

[†] Med.-Chir. Trans., vol. xiii.

[‡] Diseases of Women, p. 50.

[§] Midwifery, p. 139.

The *joints* are attacked by inflammation, and sometimes the cartilages by ulceration; and the various products of inflammation are found within the capsular ligaments.* M. Dugès has thus placed the joints in the order of frequency of disease: 1, the hip; 2, the elbow; 3, the knee; 4, the foot; 5, the metacarpus; 6, the shoulder. Dr. Ferguson has found the elbow and knee more frequently affected than the hip. M. Tonnellè met six cases of abscess of the knee; two of the elbow; and two of the symphysis pubis. Drs. M'Clintock and Hardy relate one case of puerperal arthritis of the shoulder, and another of the little finger.† Upon the whole, they agree with Dr. Ferguson as to the joints most frequently affected.

Sero-sanguineous fluid may be effused into the *muscles* or cellular substance of the limbs, giving to them the appearance of erysipelas. M. Tonnellè mentions three such cases. As to the extent of this infiltration, it may be circumscribed within a few inches, or it may extend between two joints, rarely occupying the whole limb.

An *abscess* may be formed in the muscles or cellular membrane of a limb; or a succession of abscesses may occur, as in the case I have mentioned; or the pus may be diffused through the various soft structures. The quantity is sometimes enormous; the patient suffers much pain, and may be seriously injured, if the discharge continue long. The symptoms in the latter case are those met with ordinarily in abscess, except that at the beginning they sometimes resemble a rheumatic attack.

MORBID ANATOMY.—The primary morbid change is evidently in the veins of the uterine region; their coats are thickened, and sometimes so much contracted as to render the canal impervious. The lining membrane is generally paler, and coated with lymph or pus, which may extend to a considerable distance.‡ According to Boivin and Dugès,§ "It is in the lateral veins, at the point where they are collected together to leave the uterus, and merge into the plexus of the ovarian veins, that the pus is most commonly found; in some rare instances, all the sinuses are filled and even distended with it; sometimes there are albuminous concretions mixed with the fluid; even the veins are occasionally obliterated by a yellow concrete matter. When the substance is entirely fluid, the interior of the vessels is of a light rose colour, whitish, and smooth, and often even pale and yellowish. We have observed, though only twelve or fifteen times, that this inner surface was uneven and adherent to the albuminous flakes."

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* Lee on Diseases of Women, p. 50. Beatty, Dublin Journal, vol. xvi. p. 340.

† Lee on Diseases of Women, pp. 12-24.

‡ Ferguson on Puerperal Fever, p. 39. J. G. Sasse, De Vasorum Sanguif. Inflam. Halle, 1797.

§ Diseases of the Uterus, trans., p. 327.

The disease may be confined to the veins of the uterus, or may involve those of neighbouring parts. The spermatic vein is the one more frequently affected, then the hypogastric; but it may involve the renal veins, as far as the kidneys, or even the vena cava. It is remarkable, that it is generally the veins of one side only that are affected, and that side is the one to which the placenta was attached. When the disease affects veins distant from the uterus, the surrounding cellular tissue is hardened, and contains puriform matter.

Dr. Ferguson observes that, "In a certain number of cases, no lesion can be discovered in the vein, but the presence of some unnatural fluid. It is disputed whether it is absorbed, or the product of venous inflammation. It is of little moment which of the two opinions be adopted; the disease depends not upon how the matter is produced, but whether it enters the circulation. Whether this be by absorption or by inflammation, puerperal fever is the result."

Diagnosis.—It may in many cases be extremely difficult to distinguish this from the other varieties, at least in the early stage.

Generally speaking, the pain and tenderness are more local and limited than in *peritonitis*, and at an advanced period the presence of the secondary disease will at once indicate its true character.

Treatment.—Severe cases of this species of puerperal fever appear to defy all our resources. When it is the prevailing characteristic of an epidemic, the vast majority will die.

"The two indications," says Dr. Ferguson, "are, 1, to attend to the local lesions; 2, never to forget that these are not the disease, but merely the effects of a more diffusive, though concealed cause, to act on which our remedies should be directed. The *rationale* of the treatment, therefore, consists in the exhibition of such remedies as will act on this cause, and such as will alleviate or remove the local affections; taking care that in our attempt to effect the latter end, we do not so act on the constitution as to give additional energy to the more deadly power of the concealed cause."

This rule should direct our employment of leeches, blisters, calomel and opium, &c., in the early stage, and stimulants and tonics in the latter. Dr. R. Lee says that "The French physicians, however, are of a contrary opinion, and are satisfied that we possess a powerful remedy, even in the worst cases, in mercury, employed so as to excite salivation. In several cases of uterine phlebitis, I have employed this remedy to a great extent, externally, and speedily brought the system under its influence: yet the progress of the symptoms was not arrested; and the patients died as others had done, when the mercury had not been administered. In other cases I have employed mercury to a great extent, internally, without the slightest benefit; and it may justly be doubted, from the results of M. Desormeaux's practice, whether or not it possesses the influence M. Tonnellè supposes; for of forty-three cases where mercury was used by him as the chief remedy, only fourteen recovered."*

Dr. Copland speaks in a more hopeful tone as to the results of treatment. "Hunter's treatment of phlebitis," he says, "was powerfully tonic, stimulant, and restorative; and he directed it with the view, correct both in pathology and therapeutics, of enabling the vessels of the diseased part to throw out lymph capable of coagulation, and of assisting the powers of life by these and other means to resist the progress and retrieve the consequences of the disease." Dr. Copland advises a small venesection, or leeches if necessary, and afterwards turpentine fomentations, a full dose of calomel, camphor, and opium, followed by turpentine, by the mouth and in form of enema. "In most instances the intention is not so much to evacuate the bowels (for they are often sufficiently open), as it is to exhibit a remedy which is calculated, by its passage into the circulation, at least partially to resist the changes taking place in the blood and vascular system generally, and at the same time to procure the discharge, both from the bowels and from the uterus, of such morbid matters as would be inevitably most injurious if retained even for a short period." Dr. Copland seems to have obtained more favourable results from the use of turpentine than most other practitioners. In Dublin, although it is occasionally beneficial, I do not know that much confidence is placed in it.

I feel very much inclined to agree with Dr. Copland, that probably "no other plan of cure will be found more beneficial for it than that now advised; that no other than powerfully restorative, tonic, and soothing means will be found beneficial in this form of phlebitis, or indeed in any other."†

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* Diseases of Women, p. 113.

† Dictionary of Practical Med., part xiii. p. 535.

V. Inflammation of the Uterine Lymphatics. — This variety of puerperal affection was first noticed in France by M. Dance; and since by Boivin and Dugès,* Tonnellè, Duplay, Cruveilhier, and Nonat:† the former found pus in the lymphatics in thirty-two cases, and in the thoracic duct in three.

In this country, it was first recorded by Dr. R. Lee, in the following case, published in the Medico-Chirurgical Transactions.‡ "A woman, aged thirty, in an advanced state of pregnancy, was admitted into St. George's Hospital, July 1st, 1829, under the care of Mr. Cæsar Hawkins, in consequence of sloughing of the skin covering a diseased bursa of the patella. The removal of the bursa was followed by great constitutional disturbance, and, on the 14th, labour came on. Two days after, symptoms of uterine inflammation made their appearance, and on the eighteenth day death took place. Though the pain was relieved by bleeding, she never rallied after the attack. On examining the body, some puriform lymph was found in the pelvis, but there was no increase of vascularity in the peritoneum. In the broad ligaments some fluid was also effused, and on each side numerous large absorbent vessels were observed passing up with the spermatic vessels to the *receptaculum chyli*, which was unusually distended. All these vessels, and the reservoir itself, were filled with pus, but that in the receptacle was mixed with lymph, so as to be more solid; the vessels themselves were firmer and thicker than usual. The thoracic duct was healthy. The uterus was scarcely contracted, and the internal surface of the lower half was soft and shreddy, and in a state of slough. The upper part, where no pus was found externally, was also healthy, or nearly so, on its inner surface."

Boivin and Dugès state that the lymphatics "from half a line to a line in diameter, may be seen, in consequence of their injection with fluid, which distends them in the whole length of the ligaments which contain the ovarian veins: we have observed the lumbar glands in some cases lengthened by the pus injected into the vessels; and it has been found even in the thoracic duct."§

The local symptoms are exceedingly obscure, and the constitutional ones quite as severe as in uterine phlebitis, and in the present state of our knowledge not to be distinguished from them. The secondary lesions also resemble those in phlebitis.

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* Diseases of the Uterus, p. 329.

† Revue Méd., 1837.

‡ Vol. xv. p. 64.

§ Diseases of the Uterus, p. 339.

As to the *treatment*, we are quite at a loss; as yet, we know of none capable of controlling the disease.

VI. GASTRO-ENTERIC FEVER.—I am not quite satisfied to include this puerperal affection under the head of puerperal fever, because it rarely involves the uterine system; and because, on the whole, its course and termination are favourably contrasted with the other forms of childbed fever. Yet as it is not unfrequent, and I have known it prevail epidemically, and as I have no other place for it, I have ventured to place it here.

The affection prevailed epidemically in Dublin in 1851, and less extensively in 1852. I saw twelve or fourteen cases of the disease. It resembled "weid" in some degree, but with a considerable difference, and differing yet more widely from the ordinary forms of puerperal fever. Dr. Ferguson has described one form of puerperal fever, which seems to have a close resemblance to this affection; yet his "second form," with gastro-enteric irritation,* seems to be a much more serious attack than the one which I am about to describe.

I shall venture to describe the disease from my own experience, first relating one or two cases, the better to enable my readers to form their own judgment.

CASE I.—Mrs. —— was confined of her tenth child in July, 1851. The labour was natural, the lochia and milk secreted amply, and she progressed favourably until the eleventh day. On the morning of that day, on which she was to leave her bed for the first time, before attempting to rise or dress, and without the slightest apparent cause, she was attacked with a rigor, followed by heat and sweating. The pulse became quick, and remained at about 100. The tongue became furred and white; the bowels flatulent and constipated. The milk, which had been abundant, almost entirely disappeared. The uterus was neither enlarged nor painful, nor was there any tenderness on pressure. The lochia continued natural in character, though diminished in quantity. A day or two afterwards, the bowels, which had been freed by medicine, became too much relaxed, accompanied by a most distressing amount of flatulence and frequent griping pain. The pulse very slowly diminished in frequency, and the milk gradually returned.

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* On Puerperal Fever, p. 22.

Throughout, the uterus and its secretions were apparently unaffected. On the morning of the eighteenth day the patient appeared much better, nearly convalescent; but, in the course of the day, she had another rigor, followed by fever, which subsided, after twenty-four hours, like an attack of weid. From this time, her convalescence was uninterrupted, though slow, and the milk was ultimately restored to its usual abundance.

Case II.—Mrs. M—— was confined of her second child, January 14th, 1852, after a favourable labour. The placenta was expelled in a few minutes, and everything went on well until the afternoon of the 16th, when a rigor occurred after taking some castor oil. Soon afterwards, most violent pain in the bowels came on and continued, but increasing in paroxysms. There was considerable tenderness on pressure, but not over the uterus especially. To the rigor, of course, succeeded fever. The skin became hot; the pulse rose to 130, with little or no thirst, but with a total loss of appetite. There was neither nausea nor vomiting, and the bowels were freely moved by the oil. Neither the milk nor the lochia were arrested, except for a few hours. Forty drops of laudanum were given, and thirty more after an hour's interval. A linseed-meal poultice was applied over the entire abdomen. These measures were successful, to a great extent, in the relief of pain, and she obtained some sleep. January 17th.—I found that the patient had suffered a good deal of pain occasionally, but the general tenderness had greatly subsided. There was a spot, however, in the left iliac region, which was very painful on pressure. The uterine tumour was free from tenderness. The lochia were natural in quantity and appearance, but had a heavy smell. The pulse was 120; the skin hot, but moist; some thirst; bowels moved twice. Twelve leeches were applied to the tender spot in the iliac region, and the poultices continued. Vaginal injections of warm milk and water twice a-day. Twenty drops of laudanum were given immediately, and a pill of calomel, gr. j., pulv. ipecac. comp. gr. iij., pulv. Jacob. gr. ij., was ordered to be taken thrice a day. 18th.—Much relieved after the leeching. Pulse 110. Tongue white, but not loaded. Very little pain or tenderness, except in the left iliac region. Has slept better. Milk abundant. Lochia natural, and free from smell. Is much troubled with flatulence. The pills and poultices were continued. Towards evening, notwithstanding the opium she had taken, she had an attack of diarrhœa, accompanied with most distressing tenesmus and burning pain in the rectum, which was not relieved until she had had two enemata with thirty drops of laudanum in each. 19th.—Some uneasiness in the rectum, but no purging. The iliac tenderness has entirely disappeared. The milk and lochia natural. Pulse 100 in the morning, but it sank to 84 in the evening. From this time my patient gained strength, and was no more troubled with pain. The bowels acted naturally, and the appetite was increasing, when, on the seventh day from the first attack, she had a rigor of long duration, followed by heat and sweating, and lasting twenty-four hours, just as in the former case. After this, she recovered very rapidly, and has been well ever since.

Case III.—Mrs. M—— was confined about the same time as the last case, under the care of Mr. Morgan. Her labour, which was natural, was followed by smart hæmorrhage. About the third day she was seized with violent pains in the abdomen, increasing in paroxysms to an intense degree. There was no rigor; the pulse rose to 120, and the skin became hot, but there was no thirst. The breasts were full and the lochia natural. Although the abdomen generally was tender on pressure, there was no peculiar tenderness over the uterus. A full dose of laudanum relieved the pain to a certain extent, and the bowels were freed by medicine. We then applied the mercurial ointment, on lint, over the abdomen, and a poultice over it, and gave small doses of calomel, Dover's powder, and James's powder, three times a day. The next day she was much better. Pulse 110. Tongue coated; the skin cooler; some pain and flatulence, with uneasiness on pressure. Milk and lochia natural. The day after she was attacked with violent diarrhœa and severe pain in the bowels, accompanied with great exhaustion, so that we were obliged to give wine, and had some difficulty in controlling the bowels by means of opiates, astringents, anodynes, enemata, &c. After we had succeeded in quieting the bowels by these means, and relieved the pain, the pulse still continued for some days above the natural standard. In other respects the convalescence proceeded quite satisfactorily.

Although the foregoing brief cases can scarcely give an adequate idea of the attack being so alarming as it really was, yet those engaged in midwifery practice will feel that, coming on so soon after delivery, and commencing with such formidable symptoms, I might be excused for fearing that the issue would be more serious than it proved. The commencement of the attack in many cases closely resembled that of puerperal fever, and it was not until after twenty-four hours that I could feel sure that the patient had escaped the more formidable disease.

I shall now shortly lay before the reader a summary of my observations of this affection of childbed, as it appeared during the epidemic, and as I have observed it in isolated cases.

1. The attack, in almost every case, occurred within a week after delivery: in some cases on the second day; in others on the third, fourth, or fifth day. In one case only have I known it to commence on the eleventh day, and it is remarkable that this patient had, for other reasons, been kept in bed up to that time. In no case have I been able to trace this attack to any special cause, exposure, imprudence, or errors of diet; but there was evidence in some of the cases that the bowels had not been sufficiently attended to during pregnancy. For the benefit of my junior readers, I may observe that it not unfrequently happens that the bowels may be moved daily during pregnancy, and yet that there may be an accumulation of fæcal matter to a considerable extent. I remember a case in which I could trace the colon across the abdomen by enormous fæcal accumulation, although the lady had complained of diarrhœa during pregnancy. In all cases, therefore, it is necessary that we should be sure that the bowels are amply freed, and not merely moved.

2. In comparatively few cases the attack commences with a rigor, not very severe, but sufficiently well marked. In two cases I observed the rigor to be repeated at the exact interval of a week, the second attack lasting twenty-four hours, and resembling weid very closely. The sweating stage was more profuse than usual.

3. The most striking symptoms in all the cases I have seen were the pain and diarrhœa. The former came on rapidly, increasing in paroxysms, and continuing until relieved by medicine. It was general over the whole abdomen, whilst severe, but as it declined it was felt more in one part than another; I think most frequently in the left iliac region. After the first severe attack was relieved, all the patients complained of frequent flatulent pains, with great discharges of flatus. Along with, and in proportion to, the amount of pain was the degree of tenderness; but it was remarked that, after the first impression of pain, the pressure, if equal and firm, was rather a relief; also, that the uterine region was less tender than any other part of the abdomen. It is worth noting, that in no single case did nausea or vomiting occur, but in all there was diarrhœa, even in those in which the bowels were confined at the commencement of the attack, or in which large doses of opium had been given for the relief of the pain. The amount varied; in some the discharges were few, but large and unhealthy; in others they were very numerous, and followed by great exhaustion.

4. The pulse was invariably quick at first, generally 120, sometimes 140, and gradually subsiding as the distress diminished. In a few cases it continued quick for many days, and excited much uneasiness. Its frequency was accompanied by heat of surface at first, which, however, soon diminished. In most cases there was a good deal of perspiration, and in one or two it was excessive. The absence of thirst was rather remarkable in all cases, except just after the exhibition of opium. The tongue was coated with white fur, but neither loaded nor dry.

5. In every case but one the secretion of milk was unaffected, the breasts remaining or becoming full and hard. In the exceptional case, the milk, which had been abundant, was completely suppressed for a time, but ultimately restored.

6. The lochia were generally diminished or suppressed for a few hours at first, but they speedily returned, and occasionally had a heavy smell for a day or two, after which they became natural and healthy.

7. I have already mentioned that, in two of the cases, there occurred a repetition of the rigor, followed by heat and sweating, like an attack of weid.

8. As a general rule, the attack lasted about a week; few were convalescent earlier, and one or two were protracted a few days longer.

9. I need not say that the diagnosis was a matter of extreme anxiety to me, beginning, as the attack did, with so much resemblance to puerperal fever, and presenting such formidable symptoms. However, one thing was clear, that, whatever else I might have to treat, I had undoubtedly to deal with a severe attack of intestinal irritation, as was shown by the pain, its fluctuations in seat, and its paroxysmal character, and which was confirmed by the occurrence of diarrhœa. So far was clear; but then arose the question as to whether there might not exist enteritis or peritonitis; and some support to this view was afforded by the rigor, the quick pulse, and the tenderness; but then the pain was shifting and paroxysmal, which is not generally the case in these diseases, and the tenderness was superficial, and not increased by prolonged pressure. Add to this, that the decided improvement in the course of twenty-four hours negatived such a supposition. There then only remained the question of how far the uterine system was involved; and as I found no particular tenderness over the uterus and no enlargement of that organ; that the lochia, if modified for a few hours, shortly resumed their natural character; and lastly, that the secretion of milk was abundant and unchecked, I came to the conclusion that the uterine system was

unaffected, that no inflammation existed in the peritoneal serous membrane or in the intestines generally, but that the attack was one of severe irritation of the gastro-intestinal mucous membrane, accompanied with high fever, from some unexplained cause.

10. In the epidemics I have described I saw no fatal case, nor do I think such a result will occur unless the uterine system become involved, which would place the case in a different category. Such complications, however, do occur, and I have seen several such cases in consultation which terminated less fortunately. The indications of such an extension of the disease will be found in the increase and permanency of the fever, perhaps in its change of type, in the suppression of the milk and lochia, and in the local tenderness on pressure.

11. The *treatment* was simple enough, and very successful. The first object was to relieve the pain by large, and, if necessary, repeated doses of opium by the mouth, or by enemata of laudanum and starch, and externally by poultices of linseed-meal, alone or mixed with flour of mustard. When relief was obtained, if the bowels had not been sufficiently moved, I gave a dose of castor oil, but had I known that diarrhœa would follow the pain, as it generally did, I need not have done this. I then, as a safeguard, gave small doses of calomel or grey powder, with Dover's and James's powders, three or four times a day, and in two or three cases applied the ung. hydrarg. to the abdomen underneath the poultices. After I became more familiar with the attack, I either omitted the mercury altogether, or left off the moment I was satisfied that the uterus was unaffected, but I continued the James's and Dover's powders and the poultices, until all pain and uneasiness ceased.

The flatulence was most effectually relieved by camphor mixture, with aromatic spirit of ammonia, compound spirit of ether, and tincture of orange-peel. I kept the patients on low diet at first, of course, and I found it necessary to be very cautious for some time, in increasing the nourishment, as a meal was very apt to be followed by pain and flatulence.

VII. MALIGNANT PUERPERAL FEVER.—This form is comparatively rare, except when the disease prevails epidemically. It may attack the patient before delivery, immediately after, or after some days, and perhaps the most frequent time is at the end of the second or the beginning of the third day. "In the case of a female attacked *before delivery*," Dr. Copland observes, "to which I was called by Mr. Barnwell, the symptoms were the same as those observed by me in other cases. This patient was seized early on the 12th of February with acute pain throughout the abdomen, with enormous distension, and exquisite tenderness; with very rapid, full and soft pulse, varying from 130 to 136, and with frequent vomiting. I saw her in the afternoon of the same day. The vomiting and state of the pulse were as here stated. She complained of headache and of thirst, and was very despondent. Her tongue was broad, flabby, slimy, and tremulous; her countenance pale, anxious, and covered by perspiration, and her general surface warm, moist, and clammy. Labour pains came on that evening, but were inefficient, the action of the uterus having ceased. Mr. Barnwell administered secale cornutum, which ultimately induced uterine action, and she was delivered after a labour of about twenty hours. On the following day (the 16th), the distension and tenderness of the abdomen were diminished; but the sickness and vomitings, with borborygmi and flatulent eructations, continued. Apathetic depression of spirits, anxious expression of countenance, flabby and slimy state of tongue, a very rapid, fluent, and weak pulse, clammy state of the skin, scanty and almost suppressed urine, quick and oppressed breathing, a feeling of pressure of the diaphragm, requiring the head and shoulders to be elevated, were soon followed by the symptoms ushering in dissolution."*

The same author has given a graphic picture of the attack when it occurs *almost immediately after delivery.* He says that "the earliest indication of the impending mischief is the great rapidity, softness, and weakness of the pulse, often attended by pain and tenderness at the epigastrium, by sickness and vomiting, followed by general distension and pains darting through the abdomen. But in the majority of cases there are neither chills nor rigors: in a few a feeling of coldness only; and in still fewer, slight rigors. In this state of the disease the patient soon becomes despondent, predicts her dissolution, is afterwards apathetic, and makes little or no inquiry for her infant. The milk and lochia are either little or not at all diminished, or are more than usually abundant. The abdominal pain and distension are sudden and quick in their accession; but the pain soon ceases, the distension remaining, and afterwards changing its character if the disease continues above two or three days. The tongue, from the commencement, is flabby, broad, and slimy, or covered by a mucous or creamy coating; the pulse is usually from 120 to 140, or even upwards, fluent, soft, or broad; and the general surface presents a lurid, or dusky, or dirty hue, and is covered by a clammy or offensive perspiration. The countenance is pale and inexpressive, unless where the pain is acute, when it becomes anxious and covered with perspiration. The mind is but little disturbed, beyond a state of complete apathy. As the disease proceeds, respiration is short, suspirious, or difficult; the pulse, small, soft, or irregular; the bowels frequently relaxed, and the stools offensive, or passed without control. Distressing feelings of sinking, leipothymia, or restlessness, supervene, and are soon followed by symptoms of impending dissolution."

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* Dict. of Pract. Med., part xiii. p. 510.

I think it will be found that in the majority of cases the milk is not secreted at all, or very slightly, and that the lochia, which may appear natural for a day or two, become scanty, and with an offensive odour. I have also seen the abdomen remain in its natural state, neither painful, tender, nor distended; but these are rather exceptions.

The most common period, I have said, for the incursion of the disease, is on the second, third, or fourth day; but it may occur even later. Its commencement may be marked by a rigor, or more frequently by a creeping, chilly feeling, a sort of imperfect rigor. Dr. John Clarke observes, "It has hardly occurred to me to see a case in which the disease began with a shivering fit, which is common in the commencement of many other fevers, and in the cases where the constitution sympathizes with the local inflammations which have been already treated of. If there was any degree of rigor, it has been so slight as to have escaped the attention of the patient, and the observation of her attendants. Indeed, so great a diminution of the sensibility accompanies the whole complaint, that even if a slight rigor should take place, the patient might not observe it, or being sensible of it at the time, might not afterwards remember it."* Coincident with this symptom, or preceding it, or independent of it, we always find the pulse unusually quick; instead of being from 80 to 90, it is generally from 120 to 130, and often higher, confirming the accuracy of Dr. John Clarke's observation, that no woman can be considered safe whose pulse is not under 100. But not only is it rapid, but it is generally small, weak, and easily compressed, not at all a pulse which would justify bloodletting.

At an early stage in the disease, many patients complain of pain in the stomach, bowels, or region of the uterus, accompanied by more or less tenderness, and followed by distension. This, however, is by no means always the case. In a patient I saw some time ago, who died on the third day of the disease, there was neither pain, distension, nor tenderness in any part of the abdomen. In others, we find distension with but little pain and no tenderness. Sickness of stomach, vomiting, and diarrhœa, may occur at the very outset of the disease, or on the second or third day, or not till towards the termination of the disease; in some cases it does not occur at all. Dr. John Clarke says that the purging commences on the third or fourth day, or even later.

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* On Pregnancy and Labour, &c., volume on Diseases of Women, published by the Sydenham Society, p. 419.

But however the disease may commence, and however slight and few the local symptoms may appear, to the experienced eye they are always most formidable, and generally run a rapid course. The fever has a low, typhoid character; the patient is nervous, depressed, and fearful; the pulse is soft, small, and increasing in rapidity; the respiration quick, hurried, high, and often panting; the abdomen in many cases swollen, tympanitic, and painful; sometimes generally tender, sometimes only in a particular part; the lochia are sometimes altogether arrested, sometimes merely diminished in quantity, but more commonly, at least after a day or two, changed in quality, with a fœtid odour: in some rare cases they continue quite unaltered to the last. The secretion of milk, however, I have found invariably suppressed in the worst cases; in others, arrested after it had occurred. The urine appears generally diminished in quantity. The mental functions are but little disturbed till towards the termination, when it is not uncommon for the patient to be partially or temporarily delirious, but never violent. In many cases there is a peculiar nervous hurry, an excitement of manner, with tremulous movement of the features and hands. In most cases she is greatly depressed and fearful, anticipating an unfavourable result; in some few others I have known the hope of life vivid to the end. A patient I saw lately prognosticated her speedy removal to the drawing-room an hour before her death. It is very remarkable, that in most cases the natural affections of a mother seem perfectly quiescent, the patient rarely asking after, or manifesting any interest in, her child after the disease has fairly set in.

In the epidemic described by Dr. Joseph Clarke, he says, that "It always began with a distinct chilliness or shivering. The pain in the cavity of the abdomen was not more frequent in one part than in another, nor was the tenderness so great as to be much affected by such trifling causes as the pressure of the bedclothes. Little or no vomiting appeared in any stage of the disease, no delirium, and no unequivocal marks of putrescency in any part of the system. The pulse in general beat from 120 to 140 strokes in a minute. The lochial discharge and secretion of milk were not subject to any general law. Sometimes they continued regular for a short time, and sometimes they were suppressed from the beginning."*

Dr. Douglas has thus sketched this form of puerperal fever as it appeared in the Dublin Lying-in Hospital in 1812:—"The sensorium here is seldom in any degree disturbed, whereas in the other varieties it is so frequently, and even sometimes is excited to high delirium. The pulse here is usually from the moment of attack soft, weak, and yielding, and in quickness often exceeds 160; whereas in the first species it is full, bounding, and incompressible; and in the second, small, hard, and incompressible, and in both moderately quick. The eye, instead of being suffused with a reddish or yellow tint, as in the others, is here generally pellucid, with dilated pupil. The countenance, instead of being flushed, as in the others, is here pale and shrunk, with an indescribable expression of anxiety, an expression altogether so peculiar that the disease could on many occasions be pronounced or inferred from the countenance alone. The surface of the body, instead of being, as in the others, dry, and of a high pyrexial heat, is here usually soft and clammy, and of a heat not above the natural temperature; and not only is the skin cool, with clammy exudation, but the muscles, to the impression of the finger, feel soft and flaccid, as if deprived of the *vis insita* by the influence of the contagion. Indeed, there is such prostration of strength and depression of the vital principle from the very outset of the attack, that I must suppose the contagion to act upon the human frame probably through the influence of the nervous system," &c.†

Dr. Gooch found that "the cases which were so numerous in these unhealthy seasons had the common symptoms and course of puerperal fever. They began a few days after delivery; the leading symptoms were, diffused pain and tenderness, with some swelling of the abdomen, a quick pulse, which was generally at first full and vibrating. Sometimes it was small, but still it was hard and incompressible; the skin was hot, though not so hot as in other fevers; the tongue was white and moist; the milk was suppressed. As the disease advanced, the belly became less painful, but more swelled, and the breathing short; towards the end, the pulse was very frequent and tremulous, and the skin covered with a clammy sweat; even in this state the tongue continued moist and the mind clear, and death took place generally about the fifth day."‡

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* On Puerperal Fever. Sydenham Soc., p. 355.

† Dublin Hospital Reports, vol. iii. p. 154.

‡ On the More Important Diseases of Women, p. 40.

In the epidemic which appeared in Paris, in 1838, M. Voillemier describes the typhoid form as beginning with a long and severe rigor, often a few hours only after delivery; pain very intense over the whole abdomen, which rapidly became swollen; pulse feeble, compressible, and undulating, often 150; respiration hurried, anxiety extreme, severe frontal headache; countenance sunk, pale, and covered with a clammy sweat; constant vomiting of green matters; purging, stools fœtid. The patients rapidly sank at the end of a few days, or even hours. There was no regularity in the condition of either the lochia or milk.*

Dr. Copland thus sums up the characteristics of the attack: "Whatever may be the period or mode of its accession, this variety of the disease always pursues a rapid course, and unless early arrested by energetic means, it almost always tends to general contamination of the fluids and structures, and to death. At the commencement, the nervous system of organic life and the blood appear to be suddenly and seriously affected, as shown by the general loss of vascular tone and of sthenic action, by the disturbance of all the vital functions, and relaxation of contractile parts. The earliest symptom is often the remarkable rapidity of the pulse, which is also broad, open, soft, or fluent; or small, thready or irregular, but always very quick and compressible. Rigors and chills are generally absent; or if they have been present, they are either slight or of short duration. In the most rapidly fatal cases, or such as rise in crowded or close lying-in wards, they rarely occur; and in these the disease may be complicated, or present no prominent lesion or affection; the whole frame participating in the malady, through the medium of the organic, nervous, or vascular systems; or if any prominent lesion appears, the peritoneum or other shut cavities most frequently experience it, and present the appearances hereafter to be noticed."†

I have quoted thus largely from different authors, to show, in the first place, that we are not to expect any absolute regularity of symptoms, which will vary, not merely according to individual peculiarities, but also according to the peculiar character of the epidemic, which *may* differ each year, and which certainly does differ in different cities: and secondly, as illustrating the broad fact that the disease has a constitutional rather than a local origin. The most invariable symptoms are, the typhoid character, the vital depression, the quick weak pulse, suppressed milk, and disordered lochia; and I have seen more than one patient die without a single other symptom; neither pain, nor tenderness, nor swelling of the abdomen or its contents. Of course, in most cases other symptoms are added, such as I have already enumerated; but I feel it important to impress upon my junior readers that the disease is to be judged by the *character* of the symptoms present, and not by their number nor by the amount of suffering.

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* Journ. des Connoiss., Méd.-Chir., Dec. 1839, Jan. 1840.

† Dict. of Practical Medicine, part xiii. p. 520.

The disease advances with varying rapidity, and in its progress the symptoms increase and assume a more fatal character. The heat of skin is not augmented, but the surface is pallid, clammy, and assumes a dirty colour, with dark circles about the eyes. The pulse becomes quicker, smaller, and weaker, and, towards the end, irregular and intermitting. The respiration is rapid, irregular, and often sobbing; the tongue moist, sometimes clean, but generally loaded with a whitish or yellowish fur, indented by the teeth, and tremulous. Occasionally, though rarely, it is dry and brown, as in typhus fever. The nausea and vomiting may increase or diminish, and there are frequent eructations, of bad flavour. The abdomen becomes very tense, with constant, or more commonly irregular, stings of pain, with heat, or general tenderness. The patient may either suffer from intense restlessness and anxiety, or lie in a semi-torpid state. The mind gradually becomes apathetic and indifferent, and the patient may either gradually and quietly, though rapidly, sink, or dissolution may be preceded by restlessness, dyspnœa, lividity of countenance, &c.

Dr. John Clarke mentions two symptoms worthy of notice, but which I think are by no means common:—"In some instances aphthæ will appear over the whole internal surface of the mouth and tongue, the hard and soft palate, the uvula, tonsils, and pharynx, so that they will all become perfectly white and swelled. The irritation from this cause produces a constant disposition to cough, which is also partly occasioned by the secretion of a thick mucus about the pharynx, which chokes up the trachea, keeping up a perpetual difficulty of breathing. In some instances similar aphthous appearances will be found about the anus." "In some instances purple spots have appeared before death, as in petechial fevers, probably depending either on great weakness of the vessels, which allow the fluids to escape into the cellular membrane, or upon some alteration in the state of the fluids themselves, by reason of which they are not so easily retained, or partly on the one, and partly on the other."

The local symptoms will vary very much, according to the part principally affected; for I believe that any of the forms of local disease, already described, may be found complicating this low childbed fever.

1. In some cases, there are absolutely no symptoms indicating abdominal disease. Neither pain, tenderness, nor distension is present. In a case I saw, to which I have referred, although the symptoms were of the worst kind, the only local symptom up to death was inflammation of a small bunch of varicose veins of one leg, which was soon much relieved.

2. Peritonitis appears to be the most frequent local affection, judging from the descriptions of the different epidemies; but the practitioner would be greatly deceived who expected it to present the acute and well-marked symptoms usual in the ordinary cases of that disease. All the local characteristics are, if I may be allowed the phrase, muffled. There may be pain, even severe pain, but it rarely amounts to the agony we witness in idiopathic peritonitis; very often it is but slight, and in paroxysms, diminishing as the disease advances; and in two or three cases, in which I found after death universal peritonitis, there had been neither pain nor tenderness.

3. If the inflammation chiefly or solely occupy the womb or its appendages, there may be a good deal of pain, tenderness, and enlargement; or it may be slight and obscure, and only to be detected by a careful and minute examination. In the latter cases, I have most commonly detected a tender spot on one side or other of the body of the uterus, and sometimes even when there has been no perceptible enlargement, and no tenderness when the uterus was generally pressed.

4. In some of the worst cases I have seen, presenting the most marked typhoid character, with apparent freedom from local disease and running the most rapid course, the only local lesion was uterine phlebitis, sometimes accompanied with tenderness on pressure at the sides of the uterus, but very often without pain or tenderness. But in such cases the disease is too quick in its course for the secondary characteristic lesions to show themselves, and therefore during life we can only assume the probability of venous or lymphatic inflammation.

In general, subject to the modifications I have mentioned, the local affections will present the symptoms and characters I have already described under the several heads; and I repeat that, in the low malignant childbed fever, we may find any of these local affections, or even two or more combined.

The *duration* of the disease varies much. In certain epidemies, cases have ended fatally in twenty, twenty-four, or thirty hours from their commencement; generally speaking, however, the final termination is most frequent from the third to the fifth day. Dr. Collins thus enumerates the periods of the commencement and termination of the cases he has recorded :—"Of eighty-eight cases that occurred during my residence, one had the disease well-marked before delivery; one was attacked in six hours; one in nine; one in ten; three in twelve; one in thirteen; one in fifteen; two in seventeen; one in eighteen; one in twenty; one in twenty-one; and two in thirty hours from delivery. Thirty-two were attacked on the first day; twenty-nine on the second; eight on the third; two on the fourth; and one on the eighth day. The disease seems to run its course with great rapidity in most instances. In fifty-six deaths in the hospital, it proved fatal at the following periods after the date of the seizure—viz., two in twenty-four hours; one in twenty-seven; one in thirty-six; nine on the second day; fifteen on the third; thirteen on the fourth; four on the fifth; five on the sixth; three on the seventh; two on the eighth, and one on the eleventh."*

PATHOLOGY.—MORBID ANATOMY.—I must refer my readers to the foregoing sections of this chapter for a description of the peculiar morbid appearances observed in the different species of local affection, peritonitis, hysteritis, phlebitis, &c.; but in this malignant form there is in addition, as Dr. Copland has observed, an impaired cohesion of the tissues generally, and more or less of a turbid serous effusion into the serous cavities. He mentions also that in several cases in which bloodletting had been practised, "on every occasion I was struck by the peculiar faint odour and very dark hue of the blood; by the very soft state of the clot when the blood did separate into crassamentum and serum; by the appearance which occasionally presented itself, of a mass exactly resembling in colour and consistence a common jelly, the colouring matter covering the bottom of the vessel in the form of a precipitate; and by, in some instances, a slight separation only of serum, the large, loose, gelatinous crassamentum, consisting chiefly of this jelly-like matter, the lowest stratum of which contained the black or dark-brown precipitate of colouring matter. These appearances of the blood were presented in several cases in the hospital, in 1823 and three or four subsequent years, in which cases blood had been taken before I saw the patients. It may here be remarked that I have seen many cases of this form of the disease, in which leeches had been applied to the abdomen; but in nearly all, and especially in those which occurred in the hospital, the blood which flowed from the bites did not coagulate;

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* A Practical Treatise on Midwifery, &c., p. 382.

and great difficulty, almost amounting to an impossibility, of arresting the bleeding from them, was generally observed, owing both to the state of this fluid, and to the impaired vital cohesion of the tissues characterizing the advanced stage of the malignant form of this domestic pestilence."*

In a former section of this chapter, I have adduced other evidence of an altered state of the blood, and judging from all the evidence we possess, I am inclined to believe that the pathology of this malignant form of the disease consists in a depravation of the circulating fluid, either from absorption of noxious matters, or from inflammation of the veins, or from both combined, and accompanied by a diminished cohesion of the tissues generally.

Causes.—I have already enumerated every imaginable cause, I think, to which puerperal fever has been attributed, and I need not now recapitulate them. I shall merely observe, that a natural and easy labour does not necessarily preclude an attack, nor does a considerable loss of blood confer any immunity; on the contrary, when the disease prevails, whatever depresses the system seems to favour its production. It is chiefly when the disease is epidemic that we see this low and malignant form, and a knowledge of this fact, and of the coincident prevalence of erysipelas, should put practitioners on their guard, and induce tenfold more care and watchfulness than usual. Nor although the more numerous cases occur in hospital or dispensary practice, are we to anticipate an immunity in private practice. During the epidemics in this city, there have been several cases among the richer classes, which proved fatal. And in the more recent epidemic, the prevalence of the disease among the better classes has been still more remarkable. In addition, I have remarked that during an epidemic, even if the disease do not appear in private, lying-in women do not recover as frankly as usual.

I have already said enough about contagion, and earnestly cautioned those engaged in practice to adopt every possible precaution to avoid being the agents in spreading it. It would surely be a life-long sorrow to feel that a patient had been sacrificed to our carelessness.

Diagnosis.—There can be no difficulty in distinguishing this disease from every other; its occurrence soon after delivery, the alarming nature of the symptoms, and their rapid progress, are unlike any other affection.

1. *Weid* will sometimes commence very severely, and excite

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* Dict. of Pract. Med., part xiii. p. 523.

anxiety; but in general it is later in its commencement, more acute than low childbed fever in its symptoms, and comparatively evanescent.

2. The ordinary *sporadic puerperal fever* is more acute, and with more prominent local symptoms; there is nothing like the low typhoid character of malignant puerperal, except in uterine phlebitis; and if the latter be rapid in its progress, the two forms of the disease are similar in symptoms, and run a nearly identical course.

PROGNOSIS.—It is scarcely possible to conceive a disease in which the prognosis is more unfavourable than in a severe case of low malignant epidemic puerperal fever. Dr. John Clarke states, that according to his experience, about three-fourths die, and I do not believe this to be above the average. Of course, some epidemics are milder than others, and a larger proportion recover; in others, almost all fall victims. "The danger," says Dr. John Clarke, "seems to be greater in proportion as the accession is sooner after labour. Those who have had the disease at a later period have not been attacked with the same violence; the depression of strength has been less considerable, the tumefaction of the abdomen less extensive, and their chance of recovery has been, consequently, better. It has not occurred in my sphere of observation to see any recover in whom the swelling of the belly has been in any great degree. Indeed, it is hardly possible, when we consider the great injury which all the contents of it must suffer from the effusion of extraneous matter poured into the cavity, as will be hereafter described."

The unfavourable symptoms are, a pulse of increasing quickness and diminished strength, suppressed secretion of milk and lochia, fœtid lochia, nervous agitation, rapid, high breathing, swollen abdomen, diarrhœa, sunken countenance, clammy skin, exhaustion, &c.

On the other hand, a slower pulse, quiet bowels, diminished distension of the abdomen, natural respiration, and a warm, moist skin, with natural evacuations, and a continued supply of milk, are very favourable symptoms; but no improvement in any symptoms can be considered satisfactory unless the pulse becomes decidedly slower, fuller, and more steady.

TREATMENT.—If, by the treatment of low puerperal fever, we are supposed to mean such remedies as afford a reasonable hope of cure in the majority of cases, I must frankly avow that I know of no such remedies. As Dr. John Clarke observes, "This disease is less obedient to the power of medicine than almost any which I know. Its attack is so very insidious, and often entirely un-perceived, and its fatal termination is often so sudden, that the time when medicine could be useful has often elapsed before it has been even known that the disease existed at all." I am satisfied, that if *active* treatment be at all efficacious, or even justifiable, it must be within the first twelve hours—and how rarely do we see a patient so early? nay, in many cases I should doubt if very active treatment is ever justifiable. Thus, if bleeding be ever allowable, it must certainly be within the first twelve hours; but in the majority of cases I have seen, it was not admissible. Drs. Gordon, Armstrong, and others, no doubt, have spoken highly of the effects of early and large bleedings; but, so far as I can judge, the disease was of an acute inflammatory character. Dr. John Clarke gives the result of his experience in these words: "In the first place, then, let me caution (especially younger) practitioners not to be misled by the tumefaction of the abdomen, so as to employ the lancet with the expectation of curing a supposed inflammation. Bleeding from the system has been always attended with manifest disadvantage, although it has been tried in patients who have been apparently strong and plethoric before. It has, in some instances, for a short time diminished the pain, and the buffy appearance on the blood taken away has been supposed to justify the operation; but it generally lowers the patient extremely, and in some cases I have known it evidently hasten death. Bleeding from the skin of the belly by leeches, though it do not produce the same degree of debility, yet has in no instance, within my knowledge, contributed in any degree to the cure of the patient." He equally objects to blistering the abdomen; but from the cases I have seen, I am inclined to think it useful, and it affords an opportunity of applying mercurial ointment to a highly absorbent surface.

Mr. Norris has tried the application of the tincture of iodine over the abdomen, both in the sthenic and asthenic forms of puerperal fever, and from his testimony to its success I should be anxious to give it a fair trial.*

M. Doulcet's plan of emetics seems to have failed in producing the beneficial results he expected. Dr. Copland tried it, but it did not succeed, and in Dr. John Clarke's hands it was disadvantageous.

Calomel, in small or large doses, with or without opium, seems to be our sheet anchor, especially if we see the patient early. I have seldom found it possible to give it in large doses, in consequence either of the existing intestinal irritation, or of the irritation produced by it; so that I have generally given it in doses of one or two grains of calomel, with one-third of a grain of opium, or two or three of Dover's powder, every two, three, or four hours. At the same time I must candidly confess that, latterly especially, I have not found mercury to exert so decidedly beneficial an influence upon the disease, and it has frequently aggravated the suffering by occasioning diarrhœa. Can it be owing to the changed type of the disease, just as we find bloodletting, formerly so useful, now impracticable or injurious? Dr. Copland derived more benefit from the larger doses of calomel and opium, every five or six hours, with a dose of turpentine and castor oil. He also tried "the effects of camphor in large doses, in conjunction with calomel and opium, or with quinine and capsicum, omitting the calomel, aided by the turpentine, and preceding them by an emetic, when its use was indicated by the symptoms." If the diarrhœa be troublesome, the calomel must be omitted, but mercurial inunction may be substituted, and I have found the linim. hydrargyri of the London Pharmacopœia very useful.

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* Med. Times and Gaz., Dec. 11, 1852.

Dr. John Clarke's plan was to give bark, in powder and decoction, with opium, wine, fomentations to the abdomen, &c. In some cases a gentle emetic was given, and emollient or anodyne elysters if diarrhœa were present.

The spirits of turpentine seems to be of use in some cases, but certainly not to the extent supposed by Dr. Brennan. It forms an admirable fomentation to the abdomen when blisters are not used, and if the bowels be confined, is a useful addition to castor oil, as a purgative, given either by the mouth or as an enema. It may be given in doses of from two drachms to half an ounce, once or twice a day, but it is so disagreeable to the stomach, that after a few doses patients frequently refuse to take any more.

Many remedies which have been found beneficial in the other and more local forms of puerperal fever, seem to be of little or no use in this variety, so that our means of treatment seem reduced to leeches, at a very early period; fomentations or blisters to the abdomen; calomel and opium, camphor and turpentine, wine, and other stimulants.

From the asthenic or typhoid character of this disease, and the atmospheric constitution during which it prevails, I feel myself inclined to anticipate more favourable results from a treatment resembling that of other typhoid affections. It is true, that bark, given in the Dublin Lying-in Hospital did not succeed, but yet I should be inclined to try it in such cases as I have described, and we have the testimony of Dr. John Clarke, and Lowder, and others in its favour.

I have no doubt whatever of the propriety of keeping up the strength by the timely administration of nourishment, and of the exhibition of wine much earlier and to a more liberal extent than has been usual. In truth, the type of disease generally and equally of puerperal diseases has so much changed of late years, that instead of the antiphlogistic treatment, which was undoubtedly successful, we must substitute a different, and in some respects an opposite, treatment, to be equally successful at present. Attention to this change of type will explain the success of different remedial measures, and is absolutely necessary to the scientific practice of our profession.

When the disease occurs in hospitals, the patient should be separated from all others, with separate attendants, and the greatest cleanliness observed. Before the ward is again used, it should be well scoured and ventilated, the bedstead scoured, the bedclothes washed, and the bed washed, or burned, which is better.

CHAPTER XXVIII.

PUERPERAL SCARLATINA.

In a condition so susceptible to blood poison, and one of such excited nervous and sensorial sensibility as childbirth, one cannot wonder that the occurrence of what has been called blood diseases should occasion great alarm. We all have met with measles under such circumstances, but luckily it does not seem to involve much danger. Not so, however, with scarlatina; always dangerous, it sometimes proves very fatal indeed.

The occurrence of this disease varies very much. No case is mentioned in Dr. Collins' report. In Dr. M'Clintock and Hardy's only one case which proved fatal, or from 1840 to 1847. In Drs. Johnston and Sinclair's report, from 1847 to 1854, two cases only are recorded, which proved fatal.

In a valuable paper read before the College of Physicians, Feb. 2nd, 1859, Dr. M'Clintock gives 28 cases, of which 7 died.

Dr. Halahan has published 25 cases, of whom 19 died, showing a vastly increased mortality. The entire number given here amount to 56, of which 29 proved fatal. I shall take the liberty of extracting Dr. Halahan's instructive tables:—

Nineteen Fatal Cases of Puerperal Scarlatina.

No.	Hours in Labour.	Length of 2nd Stage.	Sex and state of Child now born.		No. of Pregnancy.	Presentation.	Position of Head.	Mode of Delivery.	Social State.		Day of Death after Parturition.	First Day on which Eruption appeared after Delivery.
		hrs.	M.	F.					Married.	Single.		
1	3	1½	1	...	8th	Head	4×1	Natural	1	...	7th	3rd
2	24½	1⅙	...	1	1st	Head	3×2	Natural	...	1	5th	2nd
3	18	1	1	...	1st	Head	...	Natural	1	...	5th	2nd
4	26	2¼	...	1	1st	Head	3×2	Natural	1	...	5th	1st
5	5¾	1¾	...	1	7th	Head	3×2	Natural	1	...	7th	3rd
6	15	2½	...	1	3rd	One foot	...	Natural	1	...	2nd	From time of delivery
7	14	1¾	1	...	1st	Head	4×1	Natural	...	1	5th	2nd
8	9	7	...	1	1st	Head	3×2	Natural	1	...	15th	2nd
9	26	2	...	1	1st	Head	...	Natural	...	1	4th	1st
10	10½	...	1	...	5th	Head	...	Natural	1	...	5th	2nd
11	6½	1	1	...	3rd	Head	...	Natural	1	...	4th	1st
12	12½	1¼	1	...	3rd	Head	...	Natural	...	1	5th	2nd
13	18	3	1	...	6th	Breech	...	Natural	1	...	7th	3rd
14	27	4½	...	1	1st	Head	4×1	Natural	...	1	2nd	From time of delivery
15	3	¼	1	...	7th	Head	...	Natural	1	...	2nd	From time of delivery
16	19	...	1	...	5th	Head	4×1	Version	1	...	3rd	1st
17	23	7½	1	...	1st	Head	...	Natural	...	1	6th	2nd
18	23	3½	1	...	1st	Head	...	Natural	...	1	8th	2nd
19	4¾	1¾	1	...	5th	Head	3	Natural	1	...	6th	2nd

Six Cases of Recovery from Puerperal Scarlatina.

No.	Hours in Labour.	Length of 2nd Stage.	Sex and state of Child now born.		No. of Pregnancy.	Presentation.	Position of Head.	Mode of Delivery.	Social State.		First Day on which Eruption appeared after Delivery.
		hrs.	M.	F.					Married.	Single.	
1	72	6	1	...	1st	Head	4×1	Forceps	...	1	1st
2	14¾	4½	1	...	1st	Head	...	Natural	1	...	2nd
3	21	1	1	...	1st	Head	...	Natural	1	...	5th
4	5	...	...	1.d.p.	5th	Head	...	Natural	1	...	6th
5	40	10	1	...	1st	Head	4×1	Forceps	1	...	3rd
6	23	9	...	1	1st	Head	3×2	Forceps	1	...	5th

Dr. M'Clintock mentions that a very severe epidemic of malignant scarlatina appeared among the patients of the Vienna Lying-in Hospital in the year 1799, an account of which was published by Malfatti in Hufeland's Journal. This proved fatal in most instances on the third or fourth day, and the earlier after delivery it seized the patient, the more fatal. It presented a low asthenic type, and was best treated by stimulants.

Causes.—It is clear, from Dr. Halahan's tables, that neither the length nor kind of labour could have had any influence in causing a liability to the disease, nor of influencing its course.

Dr. M'Clintock remarks, that 17 out of his 28 cases were primiparæ; and of Dr. Halahan's 25, 14 were first children. Of his 6 fatal cases, 5 were primiparæ, thus bearing out Dr. Matthews Duncan's observations I have elsewhere quoted.

In a very valuable lecture lately published, Dr. Barnes* has spoken of the sources whence scarlatina poison may be conveyed to the lying-in women—viz., linen or blankets that may have served scarlatina patients, the clothes of the nurse or attendant, and the clothes of the medical man. From the date of the first eruption it is clear that in many cases the contagion or infection was taken before confinement.

Lastly, it may be entirely due to atmospheric or epidemic influence, though, as Dr. M'Clintock has remarked, in several severe epidemics puerperal women have escaped.

Symptoms.—These do not essentially differ from those in ordinary scarlatina, except that sore throat is less frequent and less characteristic. In only two of Dr. M'Clintock's cases was there ulceration, and not even in fatal cases did it seem to increase the distress.

Rigors occur occasionally, but not generally. The commencement seems ordinarily marked by a great increase of frequency in the pulse, heat of skin, headache, &c., with the strawberry tongue, and we shall scarcely be able to distinguish the attack from commencing puerperal until the appearance of the eruption. This may be noticed at any period from the time of delivery; in one of Dr. Halahan's cases it was noticed from that time, and in all except three the eruption appeared before the fourth day. On the other hand, Dr. M'Clintock observes, that it "was on several occasions very slow in showing itself; in one case it did not appear for ninety-six hours, and in other cases after fifty-six, forty-eight, and forty-four hours, without this delay seeming to have any unfavourable influence upon the course of the disorder, as all these women recovered. In one instance, however, where an interval of forty-seven hours elapsed before the rash came out, the woman died, but not till the thirteenth day, and then of peritonitis." At first there is no peculiarity in the rash, but in the bad cases it assumes a dark purple colour until it resembles the spots of purpura or scurvy. The pulse is infinitely quick and small, and in the severe cases the tongue soon becomes coated with brown or black fur, and dry, as in bad typhus. I have seen the mouth and fauces present the appearance of scurvy, with bleeding gums. Altogether the disease has a low typhoid character. The stomach is sometimes disturbed, but not always, and the bowels may be free or confined.

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* The Lancet, Dec. 2, 1865, p. 614.

In favourable cases, as a rule, the milk, lochia and uterine involution proceed unaffected by the scarlatina. Dr. M'Clintock remarks upon this as being the more striking, inasmuch "as at least half of his cases occurred at times when scarlatina was prevalent more or less in the hospital, and yet of the twenty-eight cases only one woman died with uterine phlebitis, and two with abdominal inflammation."

No instance of dropsical effusion supervening on the scarlatina was observed by Dr. M'Clintock, but in several instances a very distinct return of febrile symptoms at the period of desquamation, about the eighth or tenth day.

The duration of the disease in Dr. Halahan's fatal cases was as follows: four died on the second day after the eruption appeared, six on the third, six on the fourth, one on the sixth, and one on the thirteenth day.

PROGNOSIS.—In presence of the cases I have adduced, this attack must be looked upon as most dangerous: dangerous in itself, but especially on account of the circumstances of the patient.

Dr. M'Clintock emphatically confirms Malfatti's remark, that the earlier the attack the more dangerous. He says, "There is one circumstance which, beyond all question, exercises a very decided influence upon the fatality of the complaint, and that is, the period of childbed at which its invasion is made. As a general rule, the earlier this takes place, the greater is the danger to be apprehended. Of the seven fatalities among the cases which constitute the basis of this memoir, six were patients in whom the disease appeared within thirty-six hours after delivery. In the only other case, it seized the woman on the third day. Altogether there were sixteen patients attacked on the first or second day; and, as we have just seen, six died, or in the proportion of thirty-seven per cent.; whereas all those in whom the disease appeared on and after the third day, eleven in number, recovered, with one exception."

Of Dr. Halahan's nineteen fatal cases, in only three was it so late in appearing as the third day; in the rest it was either dated from delivery, or appeared on the first or second day.

Of the six cases who recovered, in one it appeared on the first day, in one on the second, in one on the third, in two on the fifth, and in one on the sixth day.

Treatment.—As we have to deal with a disease of a low asthenic type occurring in women already reduced by childbearing, it is quite clear that we must on the one hand be very chary in the use of all depressing mediums, such as purgatives, antimonials, &c., and on the other have recourse to stimulants only, and to a very liberal extent. This is Dr. M'Clintock's experience; and Dr. Halahan thus expresses himself:—

"The nature of the treatment which I have myself tried, and believe to be the only one capable of overcoming the malady, may possibly have suggested itself in the remarks already made. It is, from the *very commencement* of the disease, to give, largely and freely, *stimulants* in the shape of wine and brandy; and, as medicine, bark and carbonate of ammonia, unless contra-indicated. This I believe, and have found, will give nature a better chance of overcoming the disease, and will probably prevent any sudden and irrecoverable sinking. I would advise the same treatment in the case of those whose mind is in any way disturbed. I have lately treated such a case, and, from the hour of delivery, gave the patient *stimulants*—a pint of wine in the twenty-four hours. This had the effect of raising and sustaining the nervous system, which was greatly and alarmingly depressed; and a case of which I well nigh despaired before parturition, was conducted (by supporting the system, and keeping the mind and spirit in agreeable play) to a perfectly satisfactory issue. However the use of alcohol, when in health, may be questioned or reprobated, of its wonderful efficacy in these diseases I have not the slightest doubt; but it must be used *from the very first.* The effects produced by its exhibition in the last stages of disease, however transitory, too often, from the far-gone weakness of the patient, prove to a demonstration the folly of not employing it from the first."

CHAPTER XXIX.

PHLEGMASIA DOLENS.—CRURAL PHLEBITIS.

THIS disease, under various appellations—anasarca serosa, bucknemia sparganosa, phlegmasia lactea, œdema lactium, milk leg, white leg, swelled leg, &c. &c.—has been long known to the profession, although there has been, and still is, much difference of opinion as to its exact nature. It was described by Roderick à Castro, in 1603, and subsequently by Mauriceau, Puzos, Levret, Petit, Leake, White, Hull, Trye, &c. It consists in a colourless swelling of one or both legs (simultaneously or successively) shortly after delivery, with pain, tenderness, and fever, lasting a certain time, and running a pretty definite course. The left leg is far more frequently affected than the right, although it is not easy to account for it.

It may occur with first children, but it is more frequent after subsequent deliveries. Women of a delicate constitution or lymphatic temperament are said to be the most liable to its attacks, and especially those who suffer from any uterine irritation after delivery. It not unfrequently follows extraction of the placenta, as in Mr. Chatto's case.* Women who have suffered from it once are very apt to have a slight return of it after the next confinement, without any repetition of the cause. I have a patient in whom this occurred several times, each time in a slighter degree.

It may commence at any period after delivery, and the time makes a considerable difference in our judgment of the case, according as it begins before or after the sixth day. Of twenty-two cases observed by Dr. R. Lee, seven were attacked between the fourth and twelfth day, and fourteen after the second week. Levret mentions its occurrence on weaning the child; and Dr. Blundell,† that in "some rare instances it makes its appearance even months after delivery."

But it is not necessarily or exclusively a "*post-partum*" disease, and as it has an important bearing upon the correct pathology of the affection, I may be excused for entering into a little detail upon this subject. The earliest writer who mentions its occurrence unconnected with parturition is, I believe, Puzos, who relates two cases of pregnant women, one of four, and the other of seven months, in whom it occurred. Dr. Meigs says that he has met with many examples of phlegmasia dolens in pregnancy. Denman, Burns, Dewees, M'Clintock, &c., mention its occurrence after abortion, especially when a portion of the ovum has been left behind. Drs. Willan and R. Lee, Mr. Lawrence, Drs. Copland and Dewees, have recorded, and I have seen, cases which occurred in patients labouring under malignant ulceration of the cervix uteri. Dr. Blundell has met with the disease in connexion with malignant fungous growth from the same organ. Dr. Copland relates a case consequent upon hysteritis, in a lady who had not been pregnant for some years. The attack has also followed suppression of the menses by cold, as in the cases related by Tommasini of Boulogne, Dr. R. Lee, and Dr. M'Clintock. Again, there may be no disease or disorder of the womb or its functions, as in the cases of phlegmasia dolens accompanying dysentery related by Dr. Mayne; and lastly, it may occur in the upper extremity,* or in a well-marked form in the male sex.

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* Med. Gazette, Sept. 14, 1839.

† Obstetrics, p. 785.

SYMPTOMS.—As we have generally to do with the disease as it occurs in women who have suffered from irritation or inflammation of the womb, it is not surprising that the ordinary premonitory symptoms should commence with pain or uneasiness in the lower part of the abdomen, extending along the brim of the pelvis. I have seen this pain extremely severe, like an exaggerated after-pain, and lasting for some hours. In some cases there is a well-marked or imperfect rigor, in others nothing of the kind. The patient is irritable, depressed, and complains of great weakness, headache, and thirst. Dr. Denman remarks that, "Before the appearance of any swelling or sense of pain in the limb about to be affected, women become very irritable, with a sense of great weakness, and grievously oppressed in their spirits, without any apparently sufficient reason; complaining only of transient pains in the region of the uterus, and from these the approach of the disease has frequently been foretold. After a short time they are seized with an extremely acute pain in the calf of the leg, extending to the inside of the heel, and then, observing the course of the lymphatics, stretching up to the ham, along the internal part of the thigh, to the groin, occasioning a slight soreness in the lower part of the abdomen.†

Sometimes, however, there are no precursory symptoms, the patient being suddenly seized with pain in the calf of the leg; or it may commence like rheumatism, affecting the back and hip-joint; as Dr. Burns has remarked, "Sometimes there is no uneasiness in the belly, and the first symptom is sudden pain in the calf of the leg. Within twenty-four hours after the pain is felt, the limb swells, and becomes tense; it is hot, but not red—it is rather pale, and somewhat shining. The swelling sometimes proceeds from the groin downwards; but in most cases it is first perceptible about the calf of the leg, and proceeds upwards. It is generally followed by an abatement, but not a cessation of the pain. Sometimes the disease begins like rheumatism, affecting the back and hip-joint. Then the upper part of the thigh becomes painful and swelled, and next the calf of the leg suffers; sometimes the limb at first feels colder than the other."*

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* Dr. Winn, Med. Times, Aug. 14, 1852.

† Introduction, p. 500.

When the disease begins in the pelvis, the pain speedily extends below Poupart's ligament down the thigh, to the ham, calf of the leg, and foot. It is constant, but occasionally remitting, and not much relieved by posture, though a depending position materially increases it. Shortly after the commencement, the inguinal region is tumefied and tense, and in a day or two the thigh becomes swollen, tense, white, and shining. This swelling may be confined to the thigh, or extend to the heel, and it will vary much in amount; occasionally, the leg is enormously increased in size. When the pain originates in the back and hips, the nates and vulva become swollen, glassy, and tense. When the disease commences in the calf of the leg, the swelling is first observed there or at the ankles, gradually extending itself up the leg and thigh. The temperature of the limb is generally increased, though in rare cases it is below the natural standard. At the commencement and decline of the disease, the limb pits upon pressure; but when the distension is very great, it does not. Just as Dr. R. Lee has described:—"In several well-marked cases, however, of crural phlebitis at the invasion of the disease, the impression of the finger has remained in different parts of the limb—more particularly along the tibia; but as the intumescence has increased, the pitting upon pressure has disappeared until the acute stage has passed away. At the outset of the disease I have also observed in several cases a diffuse erythematous redness of the integuments along the inner part of the thigh and leg."

In most cases the femoral vein may be traced from the groin down the thigh, feeling hard, and rolling under the finger like a cord. Of course, this is not the case when the attack is limited to the leg. There is a degree of tenderness over the entire limb, but it is very marked along the course of the inflamed vessel; generally there is neither redness nor discoloration, but in some few cases a faint red streak may be perceived. The inguinal glands share in the irritation, and may be swollen and hard: in some rare cases they suppurate; and according to Dr. Burns, mortification has taken place, and amputation been necessary.* Abscesses may also form in the cellular membrane. Either leg may be affected; but, as I have already observed, the left is more frequently attacked; and it not uncommonly happens that the sound leg participates in the disease before the other is perfectly well, and then the disease runs a similar course a second time. Mr. Sankey observes, "Most of my patients have had both legs affected, though not at the same time; but after going through the process Dr. Wynn has described in one, the other becomes affected; and unless prevented by the application of blisters, goes through the same stages, and takes the same time as the first."† In the cases of double attack which I have seen, the second limb was certainly more slightly attacked than the first; although this does not accord with the great experience of Dr. Denman, who found the second as severe as the first.‡ I have already stated that patients who have suffered from phlegmasia dolens after one labour, are very liable to have slighter returns, without apparent cause, after the next labour. When once the swelling takes place, the limb becomes useless; the patient can neither bend it nor place it on the ground.

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* Burns, Midwifery, p. 609.

The constitution, as might be expected, suffers considerably during the attack: the pulse becomes quick (from 100 to 140) though weak, the tongue white and coated, the thirst considerable, the countenance pale, the appetite lost, the bowels deranged, and the urine turbid. The patient is restless, and generally sleepless.§ In very severe cases there is more or less tenderness above Poupart's ligament and at the side of the uterus, the lochia may be diminished or deranged, and the internal genitals are tender.

With this account of symptoms, commencing perhaps with a rigor or chill, followed by pain in the abdomen, pain and swelling in the thigh and leg, quick pulse, &c., the acute stage may continue, for one, two, or three weeks, when the more formidable symptoms having subsided, the patient is more comfortable, and the disease takes on a more local character. Dr. Stokes has remarked that the greater the swelling, the less formidable and more local the disease.

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* Midwifery, p. 609.

† Ed. Med. and Surg. Journal, vol. x. p. 102.

‡ Introduction to Midwifery, p. 507.

§ Burns, Midwifery, p. 608.

TERMINATIONS.—1. The disease may, and most frequently does, terminate in *resolution;* the general symptoms gradually subsiding, the disease becomes local; and after five or six weeks the swelling diminishes, the tenderness disappears, the general health is restored, and by slow degrees the patient recovers the use of her limbs. It is long, however, before the affected leg entirely loses its *wooden* feel, and attains its natural power of motion and sensation.

2. The subsidence may be still more gradual, the limb continuing swollen, with an occasional increase of the tumefaction for months, the patient having imperfect sensation in it, and imperfect command over it. In such cases I have noticed a dense, thickened feel of the skin, or subcutaneous cellular tissue; and in one or two cases the patient had an attack of cutaneous inflammation, resembling large hives (Urticaria), which lasted for a few days, and was somewhat painful, but then disappeared. The veins sometimes remain varicose,* but I should hardly think that this is the effect of the disease. It is more likely to have been the effect of the previous pregnancy.

3. *Suppuration* may take place, even to such an extent as to supersede and change the character of the original disease, and even to threaten death from exhaustion.

4. *Death* may occur, either suddenly, perhaps on the patient raising herself in bed; or more gradually, from exhaustion, from paralysis,† or from some of the secondary diseases consequent on phlebitis. Dr. Burns observes, "This is not generally a fatal disease, but it is tedious, and often accompanied with hectic symptoms. Death, however, may be caused by suppuration or gangrene; or by exhaustion, proceeding from the violence of the constitutional disease; or by exertion made by the patient, which has sometimes suddenly proved fatal; or, after the leg appears to be getting better, daily shivering with vomiting, pain in other parts, and rapid pulse, with delirium, precede death."‡

MORBID ANATOMY.—1. On opening the limb it is found to be distended with serum, effused into the cellular membrane.

2. The vein is found to be obliterated in some part of its course by clots of blood firmly adherent to its parietes, which are thickened; its inner membrane is of a deep red colour, the result either of staining or of inflammation—most probably the latter. A layer of coagulable lymph is sometimes found lining the different

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* Lee on Diseases of Women, p. 119.

† Todd, Cyclop. of Pract. Med. Art.: Paralysis.

‡ Midwifery, p. 609.

vessels, and they have been observed to contain purulent matter. The veins which have been found to participate in these changes are the femoral, the external, internal, and common iliacs of either side; the epigastric, spermatic, circumflexa ilii, the uterine, vaginal, and saphena veins, and the vena cava.

3. Evidences of inflammation of the absorbents have been found in a considerable number of cases, and in some, purulent matter has been detected, according to M. Bouillaud.*

4. M. Dugès has shown that inflammation of the nerves occurs, at least occasionally, as a complication of this disease.†

5. Proofs of the occurrence of the secondary effects of phlebitis may be found in different parts, especially in the serous cavities, and in the formation of abscesses of the limb, and even of more distant parts.

Pathology.—We are now in a condition to inquire into the pathology of this affection, which has given rise to so much dispute, and to such varieties of opinion. The older notions on the subject are mere speculations. For instance, Mauriceau considers it to be owing to a reflux upon the lower extremities of certain matters, which ought to have been evacuated in the lochia.‡ Puzos§ and Levret|| attribute it to deposits of milk in the affected part (*dépôts du lait*); and the same opinion has extensively prevailed in these countries, as one of the popular names for the disease (milk leg) testifies. With some practitioners it was customary to keep the child constantly to the breast, to prevent the metastasis when threatened, or to remove it when it had occurred.

In the year 1784, Mr. White, of Manchester, published an inquiry "Into the nature and cause of that swelling of one or both of the lower extremities which sometimes happens to lying-in women;" and he suggested or adopted the opinion that the disease depends on obstruction, or on some other morbid condition of the lymphatic vessels and glands of the affected parts. Mr. Trye, of Gloucester, in an essay on this subject in 1792, attributed the swelling to a rupture of the lymphatic vessels, as they cross the brim of the pelvis, under Poupart's ligament. Soon after this, Dr. Ferriar maintained that there is a general inflammatory state of the absorbents in this disease. Dr. Hull (1800) considered the proximate cause of this disease to be an inflammatory affection, producing suddenly a considerable effusion of serum and coagulable lymph into the cellular membrane of the limb.

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* Dict. de Méd. et de Chir. Prat. Art.: Phlegmasia dolens. † Ibid.

‡ Mal. des femmes grosses, vol. i. p. 446.

§ Traité des Accouch., p. 350. || L'Art des Accouch., p. 932.

All the textures—muscles, cellular membrane, lymphatics, nerves, glands, and bloodvessels—he supposed to become affected.

So far the opinions were a mixture of theory and observation, without any attempt to base them upon pathological research. The first light thrown upon the subject by a *post-mortem* examination was by Dr. Davis, Professor of Midwifery in University College, London, who in 1817 examined the condition of the veins in a patient who had died with the disease, and found that they were the seat of extensive inflammation. The dissection is as follows:—"March 6th, 1817.—The left lower extremity presented an uniform œdematous enlargement, without any discoloration, from the hip to the foot. This was found, on further examination, to proceed from the ordinary anasarcous effusion into the cellular substance. The inguinal glands were a little enlarged, as they usually are in a dropsical limb, but pale-coloured, and free from the slightest sign of inflammation. The femoral vein, from the ham upwards, the external iliac and the common iliac veins, as far as the junction of the latter with the corresponding trunk of the right side, were distended, and firmly plugged with what appeared externally a coagulum of blood. The femoral portion of the vein, slightly thickened in its coats, and of a deep red colour, was filled with a firm bloody coagulum, adhering to the sides of the tube, so that it could not be drawn out. As the red colour of the vein might have been caused by the red clot everywhere in close contact with it, it cannot be deemed a proof of inflammation. The trunk of the profunda was distended in the same way as that of the femoral vein; but the saphena and its branches were empty and healthy. The substance filling the external iliac and common iliac portions of the vein, was like the laminated coagulum of an aneurismal sac, at least with a very slight mixture of red particles; the tube was completely obstructed by this matter, more intimately connected to its surface than in the femoral vein—adhering, indeed, as firmly as the coagulum does to any part of an old aneurismal sac; but in its centre there was a cavity containing about a teaspoonful of a thick fluid of the consistence of pus, of a lightish brown tint, and pultaceous appearance. The uterus, which had contracted to the usual degree at such a distance of time from the delivery, its appendages and bloodvessels, and the vagina, were in a perfectly natural state. There was not the least appearance of vascular congestion about the organ, nor the slightest distension of any of its vessels. Its whole substance was, on the contrary, pale, and the vessels everywhere contracted and empty. The state of the abdominal cavity and its contents was perfectly natural. That the substance occupying the upper part of the venous trunk, and the fluid in its central cavity, had been deposited there during life, from inflammation of the vessel, does not admit of doubt. I am also decidedly of opinion, in consequence of its firmness, and close adhesion to the vein, that the red coagulum in the femoral vein was the result of a similar affection extending along the tube; and that the passage of the blood through it, in the whole tract submitted to examination, must have been completely obstructed before death."* He then taught that phlegmasia dolens resulted from this cause, and in May, 1823, published a paper with cases and dissections.†

In January, 1823, M. Bouillaud related several cases and dissections in which the crural veins were obliterated in women who had suffered from œdema of the lower extremities after delivery; and M. Bouillaud distinctly stated that he considered obstruction of the crural veins to be the cause not only of the œdema of lying-in women, but of many partial dropsies.‡ The date of this paper, although earlier than Dr. Davis's paper, in no way interferes with the claim of the latter to be the first who discovered and taught that phlegmasia dolens is essentially crural phlebitis. In 1824 M. Velpeau published some researches, from which he concludes that not only the veins are involved in the inflammation in some cases, but that inflammation of the lymphatics is at least as frequent a cause of phlegmasia dolens.§

In 1826 Mr. Guthrie hinted that probably the inflammation of the veins of the leg might be merely an extension from the uterine veins, and Dr. Robert Lee believed that he demonstrated this in 1829, by tracing the diseased veins back into the uterus, and finding there the disease equally well marked. "The left hypogastric or external iliac vein," he says, "was in the same condition, but in some cases reduced to a cord-like substance, and its cavity throughout completely obliterated. The branches of this vein taking their origin in the uterus, and usually termed the uterine plexus, were found completely plugged up with firm red coagula."‖ More recently Dr. R. Lee has laid before the Medico-Chir. Society the results of his experience in the following summary: the paper contained the record of forty-three cases of phlegmasia dolens. The first nine cases were accompanied by *post-mortem* descriptions and preparations illustrating the disease;

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* Letter from W. Lawrence, Esq., in Davis's Obstetric Medicine, vol. ii. p. 1204.

† Medico-Chir. Trans., vol. xii.

‡ Lee on Diseases of Women, p. 149.

§ Arch. Gén. de Méd., Oct. 1824.

‖ On Diseases of Women, p. 131.

and the author was led, from the whole of the facts thus adduced, to the conclusions he had formerly expressed, "that the inflammation of the iliac and femoral veins gave rise to all the phenomena of phlegmasia dolens, and that the inflammation commenced in the uterine branches of the hypogastric veins, and from thence extended to the femoral trunks of the affected side." The next series comprised the history of twenty cases, which the author thought furnished additional evidence in favour of this conclusion, though, in consequence of the recovery of the greater number of the patients, an opportunity was not afforded of determining by dissection the actual condition of the crural veins. Nine cases followed, which demonstrated that phlegmasia dolens might occur wholly unconnected with pregnancy and parturition, and that in such cases the inflammation likewise commenced in the uterine branches of the hypogastric veins, and followed a course similar to what occurred in puerperal cases. In some of these the inflammation of the uterine veins was produced by cancerous disease of the os and cervix uteri; in others there was no organic disease of any kind previously existing. The concluding cases were five, in which crural phlebitis had followed inflammation of the saphena veins and of the deep veins of the lower extremities, from fracture of the tibia and fibula, and pressure of encephaloid tumours on the thoracic viscera.*

MM. Petit, Gardien, and Capuron regard the disease as inflammation of the lymphatic vessels and glands.†

Dr. Burns adds another tissue as entering into the disease, for he remarks, "I consider that the nerves are implicated as much as the veins, and that whilst both may contribute, we shall find, in different cases, one or other predominate."‡ I am not aware whether this opinion was the result of *post-mortem* investigation or not, but it has since been confirmed by the researches of M. Dugès. Dr. Dewees agrees with Dr. Hull, and the able paper by M. Bouillaud so far confirms his view, as that, in his opinion, inflammation of the symphyses, veins, lymphatics, and nerves, is the proximate cause of the disease.

So far, then, it appears established—1, that in phlegmasia dolens there is inflammation of the veins of the thigh and leg; 2, that marks of inflammation are found at the commencement of these veins in the uterus; 3, that at least in some cases the lymphatics and nerves are involved in the inflammation, although probably not in the first instance, nor as a primary cause.

But still two very important questions remain: 1. Does the inflammation originate in the crural vein itself, or does it originate in the uterus, and extend down the vein? 2. May not the inflammation of the vein be owing to some special condition to which it is secondary, as, for instance, some morbid condition of the blood?

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* Lancet, May 21, 1853, p. 480.

† Mal. des femmes, p. 551.

‡ Midwifery, p. 611.

In support of the latter view, Dr. Mackenzie read a paper at the Medico-Chirurgical Society (1853), founded upon a series of experiments on animals, in which he tried—1, the application of ligatures to the iliac veins; 2, chemical and mechanical irritation of their lining membrane; and 3, sustained compression of the femoral veins by metal plates. Without entering more fully into these experiments, I may give the conclusions which the author drew from them: "1, that inflammation of neither the iliac nor femoral veins would account for, or give rise to phlegmasia dolens; 2, that the extensive obstruction of the veins met with in this disease is not producible by merely local causes, such as injury or inflammation of these vessels; 3, that irritation of the lining membrane of veins, independently of such local injury or inflammation, will only give rise to obstruction of these vessels to an extent commensurate with that of the irritation which may have been excited within them; 4, that extensive irritation of the lining membrane of veins, giving rise to obstruction and all the phenomena of phlebitis, may be excited by the presence of various unhealthy matters in the blood circulating with this fluid, and determined upon particular portions of the venous system; 5, that the origin of the disease is therefore to be sought for rather in a vitiation of the circulating fluid than in any local injury, inflammation, or disease of the veins."*

Notwithstanding the ingenuity of the author of this paper, we cannot but feel that experiments of this kind are but imperfect illustrations of the effects of disease; and secondly, that in this disease, as the two conditions exist in most cases—viz., inflammation of the veins and a source of possible vitiation of the blood—it may be impossible to decide the exact limits of each.

After careful consideration and some experience, but without wishing to express myself dogmatically, the conclusions to which I have myself arrived are the following: 1, that in phlegmasia dolens of puerperal women the most striking and general pathological condition is inflammation and obstruction of the veins; 2, that in most cases this state of the veins extends to the veins of the uterus, where the disease in all probability originated; 3, various considerations, however, lead us to conclude that the disease of the crural veins is not a retrograde propagation of the disease from the crural veins, but that the first morbid process is a vitiation of the blood, and that the effects upon the limb are produced in the course of circulation, so that, although the uterine and crural phlebitis be continuous anatomically, they are pathologically separate and distinct; and 4, that a vitiation of the circulating fluid, primary or secondary, may be a more important element of disease in most, if not all cases, than has hitherto been supposed.*

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* Lancet, March 19, 1853, p. 276.

These conclusions will embrace all cases of phlegmasia dolens, either of the upper or lower extremities, both of the puerperal and non-puerperal state, and also those which occur in men, and I think they afford an explanation (so far as we can expect one) of many of the vital phenomena of the disease, as well as being consistent with the results of *post-mortem* investigations. At the same time, it cannot be denied that there is room for further research into the state of the blood circulating in the affected parts, and other minute points of chemical or microscopical interest.

Causes.—The exciting cause seems generally to be the impression of cold or previous uterine disturbance. Almost all the cases I have seen have occurred after leaving bed at too early a period after labour.

Prognosis.—Though we cannot say that the disease is without danger altogether, when severe, yet the proportion of deaths is so small, that in the great majority of even severe cases our prognosis may be favourable; still more decidedly when the attack is slight. The danger, I think, may generally be estimated by the amount of uterine disease. I have also remarked that the severity of the constitutional symptoms is often inversely as the swelling of the limb.

Diagnosis.—The characteristic marks of the disease are, the time of its occurrence—after delivery; the uterine symptoms preceding, the pain down the thigh and leg, the swelling; but especially the painful, hard, cord-like femoral vein. When the greater part of these symptoms are present, there can be no doubt of the nature of the disease.

Treatment.—The condition of the patient after confinement will of necessity somewhat modify the activity of the treatment.

Generally speaking, venesection will not be required; but if the patient be of a plethoric habit, if she have in some degree recovered her confinement, and if the disease set in with great violence, it may be advisable. Leeches, in numbers proportioned to the severity of the attack, should be applied along the course of the femoral vein, to the groins, or to the calf of the leg, and a poultice applied when they fall off.* If decided relief be not obtained, they may be repeated in smaller numbers, once, twice, or thrice.

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* British and For. Med. Rev., July, 1854, p. 71.

As the bowels are almost always in some degree disordered, appropriate remedies must be tried. If diarrhœa be not present, purgatives may be given, and we are advised to prefer the saline.† I have seen much benefit result from small doses of tartar emetic given along with the cathartic, during the acute stage. Saline effervescing draughts may also be given.

Different statements have been made as to the effect of blisters; some regarding them as specifics. Mr. Sankey observes:‡ "What I consider a specific is a blister applied to the calf of the leg, immediately on discovering the complaint. The first I apply to the calf of the leg, as the pain is generally most severe in that part, and there is less fear of its not healing than if applied lower. If required, I repeat them every two or three days, not at the same place, but higher or lower, according to the seat of the pain." Others, as Dewees, &c., altogether rejecting them as mischievous. My own experience is decidedly in favour of their utility, although in many cases turpentine fomentations will answer equally well.

In the more acute and severe cases, and especially if there be evidence that there is irritation or inflammation of the uterus, it will be advisable to give small and repeated doses of calomel and opium until either the symptoms give way or the constitution is brought slightly under mercurial influence. In milder cases an occasional mercurial purgative is beneficial, but it will rarely be necessary to continue its administration steadily.

When the pain is severe, or the patient irritable, restless, or sleepless, opiates will be found very useful, and with them, as Denman has recommended, we may combine diaphoretics or diuretics.§

When, by these means, the acute stage has been terminated, and the constitutional symptoms relieved, the local and general treatment must be changed. Gentle support may be afforded to the limb by a tight flannel bandage, and slightly stimulating frictions employed. In this stage, especially, the frequent application of small blisters has been recommended. Dr. Denman thus expresses himself:—"Then, also, but not sooner, it is necessary and proper to support the swelled limb by a slight flannel bandage, drawn gradually tighter, and to use different applications, such as the volatile liniment, or one composed of three parts liniment. saponis, and one part of tinct. cantharid., and sometimes small quantities of the ung. hydrargyri. The frequent application of small blisters to different parts of the limb has been also then strongly advised, and in many cases with evident advantage. Electricity has been tried; but of its real benefits I am not competent to judge. Certainly, many patients have been much relieved by persevering in the use of warm sea-bathing; and they are to be encouraged, but with some caution, to use exercise."

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* Bateman's Report: Ed. Med. and Surg. Journ., vol. iii. p. 128.

† Dewees, Diseases of Females, p. 492.

‡ Ed. Med. and Surg. Journ., vol. x. p. 402.

§ Introduction to Midwifery, p. 509.

Tonics may also be given—decoction of bark, or quinine, with dilute sulphuric acid, will be found the most serviceable. With these means must be combined an improvement in the diet, gradual, yet decided—meat broths, and a fair allowance of wine or malt liquor.

If at any period of the disease the lochia should become offensive, vaginal injections of tepid milk and water should be used once or twice a day.

CHAPTER XXX.

ARTERIAL OBSTRUCTION IN PUERPERAL WOMEN.

VERY closely connected with the foregoing subject is the effect of arterial obstruction in childbed, although the disease is much less frequent. Drs. Richard and Kirkes had noticed the effect of obstruction caused by detached vegetations blocking up an artery, but Sir James Simpson is the first to have collected a number of cases and attempted an arrangement of them. He published his first case many years ago,* and to this he has since added four others from various sources.† I shall briefly quote these latter, as being the most graphic description of the disease.

"A lady, aged twenty-eight, was prematurely delivered at the seventh month. For three weeks she made a good recovery, when she became slightly feverish, with a general miliary rash on the skin and occasional diarrhœa, accompanied by abdominal pain.

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* Edin. Monthly Journal, 1847.

† Ibid., Feb. 1854, p. 175.

The lochia were hæmorrhagic for a few days. At this time the pulse was 120 and intermittent. Pains of a neuralgic type were complained of in the right limb: they subsequently moved to the left leg, and became permanent and severe. Seven weeks after delivery sudden pain was complained of in the groin, over the vessels, which was relieved by leeching. A systolic bruit was now heard on the left side of the heart. The pulse became suddenly arrested as high as the elbow, but no pain was complained of at the seat of occlusion. In a short time, with the exception of the left arm, the pulse in the extremities ceased, though it returned a few days before death. Gangrene set in on the left leg ten weeks after delivery. On a *post-mortem* examination, the left heart was filled with dark coagula. A large soft valvular excrescence was situated at the aortic aperture. It was composed of three portions, that on the right valve being the largest; and from its soft texture seemed to be of recent formation. The auriculo-ventricular aperture exhibited few traces of vegetations. At its bifurcation, the aorta was obstructed by a firm conical coagulum, not attached to the arterial walls, which extended for a couple of inches into the iliac vessels, and which contained in its interior portions of structure physically and histologically the same as the cardiac excrescence. In both extremities the vessels were blocked up by similar coagula. There was an obstruction in the artery of the right arm, the vessels being much thickened and containing pus."

In another case, furnished by Dr. Macfarlane of Glasgow, the obstruction occurred ten days after the delivery of a fifth child. Acute pain and numbness were complained of in the right arm, that continued till death, which took place three weeks after. There was no pulsation below the elbow; some could be felt in the right thigh. Gangrene commenced four or five days after. On dissection the aortic valves were found encrusted with vegetations. The aorta itself was atheromatous, and firm fibrinous clots, with a nucleus of substance like a cardiac excrescence, existed in the middle of the brachial and in the iliac arteries. Dr. Lever, of Guy's Hospital, communicated a case to Sir James Simpson in which gangrene of the left arm and leg followed acute rheumatism during pregnancy. Both in the arm and limb the pain was excessive. Vegetations existed on the valves of the heart, and were found in the arteries of both extremities. The veins contained fibrinous deposits also. In a case contributed by Dr. Burrows of St. Bartholomew's, hemiplegia suddenly occurred when the patient was recovering from symptoms due to overlactation. A loud, rasping, systolic murmur was audible. The patient ultimately died of ramollissement of the brain. A *post-mortem* examination revealed the existence of vegetations on the mitral and aortic valves. The left corpus striatum was a mere diffluent pulp. The middle cerebral artery was obstructed by a vegetation the size of a grain of wheat. The arteries of the limb were not examined. This latter case is similar to those related by Dr. Kirkes, in which a vegetation passed up the carotid and obstructed the vessels of the brain, chiefly the middle cerebral, and gave rise to softening.

Sir James Simpson has assigned the following causes for the production of the disease after delivery:—1. The separation of organized vegetations from the aortic valves. 2. The escape of recently formed unorganized masses of coagulum from the heart, and thence discharged into the circulation. 3. The occurrence of a true arteritis. 4. Certain diseased conditions of the blood, or certain morbid matters carried along in its current. 5. In one case laceration of the inner coat.

In illustration of these points, I must take the liberty of quoting very largely from the report given of this most interesting paper:—

"1. In the five preceding cases the cause was apparently the same—viz., the first which had been previously mentioned, and for the following reasons: first, because in all, the aortic valves were affected with vegetations; secondly, because one or more loose bodies, presenting a perfect similarity to these vegetations, were found in the obstructed arteries; and thirdly, the suddenness of the supervention of the arterial obstruction further showed the nature of the obstructing cause. Other circumstances rendered it probable that this cause was the true one. In three of the cases endocarditis was present either before or during pregnancy, as in Dr. Lever's case, while in Dr. Moir's the lymph on the valves was of still more recent origin, the result of puerperal endocarditis. Again, it is well known that similar morbid structures do separate from their place of growth. The so-called foreign bodies in joints, polypi from mucous surfaces, and the cases described by the late Dr. John Reid, of the separation of polypoid bodies from the external surface of the peritoneum and pleura, might be instanced. But in the heart these vegetations are much more liable to be displaced: 1st, from the looseness of their attachment; 2nd, from the constant motion of the parts; and 3rd, from the contact of strong fluid currents to which they were subjected. When detached, they were hurried into the circulation and arrested at last in vessels of their own calibre. If the mass were large, it would be arrested at the bifurcation of the aorta; if smaller, it might pass into any of the aortic branches, as the left carotid, though the reason given by Ruhl, that this vessel lies more in the current of the blood, is not so satisfactory. When the vegetation is arrested, new coagula rapidly form around it, and inflammation of the internal tunics might then take place secondarily; in the 2nd case it ultimately involved the femoral vein. Lastly, the mass might become disintegrated and broken down.

"2. The second cause has reference to morbid matters coming from the heart itself; for example, the globular polypi found in its cavity might, if small, be sent along its circulation. And though not actually separated, they may yet cause obstruction. The rough surface of the heart and valves in endocarditis might also suddenly arrest and entangle the fibrine of the blood, and polypi, thus formed and becoming detached, might produce similar effects. The experiments in which foreign bodies, as needles, &c., were introduced into the ventricle, illustrate this. Cruveilhier mentions the occurrence of gangrene of an extremity after such an accident; a needle passed accidentally into the left ventricle, and formed a nucleus around which fibrinous coagula formed, and from which they separated and were projected into the vessels. And a case of endocarditis, which supports the view in question, is related by Legroux. A case of Dr. Macfarlane's was mentioned, in which there were no vegetations, but in which coagula, in which no hard nucleus could be detected, were found to be the obstructing cause. The patient had had rheumatic fever, and died ultimately of general dropsy.

"3. Of the third cause, viz., local inflammation of an artery, Sir James Simpson gave an instance in a case which happened to Dr. Duncan, when surgeon to the Royal Infirmary. Acute gangrene of both extremities occurred four weeks after delivery, and the patient speedily sank. No disease was found in the heart, but an adherent fibrinous effusion blocked up the aorta a little above its bifurcation, and passed down into the iliacs. It was a true arteritis. The aorta was thickened, and coagulable lymph coated the upper portion of the coagulum. A similar case of puerperal gangrene was read from Dr. Cowan.

"4. The fourth cause of arterial obstruction was certain diseased states of the blood, or morbid matters circulating in it. In puerperal phlebitis there are particles of pus and fibrine circulating in the blood; at first passing from the uterine veins to the right side of the heart, and becoming deposited in the lungs, liver, &c. Now, pus or fibrine is known to serve as a nucleus for coagulating the blood; and in the pulmonary or other arteries sometimes leads to the formation of obstructing masses. Two cases of puerperal obstruction of the pulmonary arteries from this cause were given from Cruveilhier; and the possibility of various morbid appearances in the liver, spleen, &c., being explicable by the same cause, was dwelt upon.

"5. Lastly, we may possibly have puerperal arterial obstruction from rupture of the internal coat of the artery, as has been so well described by Dr. Turner. Sir James Simpson referred to an interesting case, supposed to be of this kind, described by Dr. Oke of Southampton in 1831. The patient was aged twenty-four, and had aborted. Hæmorrhage, followed by uterine pain, ensued. Severe headache, with dimness of vision, now set in; and the left arm became cold and pulseless, and gangrene supervened. It was limited, however, to the integuments of the thumb and part of the hand. There was no embarrassment of the respiration, and recovery followed. On inquiry he learned that pulsation had returned, the patient was still alive, and had no cardiac symptoms. Other cases of puerperal arterial obstruction ending in gangrene were described."

SYMPTOMS.—These vary somewhat according to the artery obstructed—cessation of the pulsation in the limb, pain often intense, paralysis, and ultimately gangrene, seem to be the most characteristic symptoms.

If, as in Dr. Brennan's case, the cerebral arteries be obstructed, we may find softening and hemiplegia.

The concurrence of these symptoms with valvular disease of the heart, will at once excite our suspicion, not only of obstruction, but of the special cause of it.

I am not aware of any treatment which has been found useful.

CHAPTER XXXI.

PUERPERAL MANIA.

FEMALES may suffer from an attack of mania during gestation, during labour, or after parturition. The two latter cases will occupy our attention in this chapter. The temporary delirium, or mania, which occurs during labour, was, I believe, first recorded by the late Dr. Montgomery. It appears at two particular periods of the labour—first, as the head passes through the os uteri, and again, at its exit through the os externum. It would appear to be owing to the extreme suffering at these times, acting upon an irritable and nervous temperament. It is very temporary, generally lasting but a few minutes, and then subsiding. The most curious point about it is, that the patient is generally conscious of her incoherence. As Dr. Montgomery observes, "It comes on suddenly during perfectly natural labour, and most frequently at that particular stage of the process which I have pointed out (dilatation of the os uteri). It is not accompanied nor followed by any other unpleasant or suspicious symptom; it occurs, perhaps, immediately after the patient has been talking cheerfully, and having lasted a few minutes, disappears, leaving her perfectly clear and collected, and returns no more, even though the subsequent part of the labour should be slower and more painful. In every instance which came under my observation, the patients were conscious that they had been wandering, and occasionally apologized for anything wrong they might have said, although they were not aware of what the exact nature of their observations might have been."* I have seen several cases of this kind, and, without exception, they corresponded very accurately with this description of Dr. Montgomery's. In one case the delirium, which occurred first during the dilatation of the os uteri, returned as the head was passing through the os externum; and this patient informed me that she was conscious of talking nonsense, and had in vain endeavoured to resist it. Dr. Montgomery attributes this momentary incoherence to the suffering attendant upon the forcible distension and dilatation of the cervix, and there can be no doubt, I think, that this is the true explanation.

I shall now proceed to the consideration of *puerperal mania*, or that form of insanity which occurs in childbed soon after delivery, or at the commencement of suckling. It is a very distressing malady in itself, but doubly so from occurring at a moment ordinarily so joyful: and yet we cannot be surprised at the susceptibility manifested at this particular time, when we remember that "the sexual system in women is a set of organs which are in action only during half the natural life of the individual, and even during this half they are in action only at intervals. During these intervals of action they diffuse an unusual excitement throughout the nervous system: witness the hysteric affections of puberty, the nervous susceptibility which occurs during every menstrual period, the nervous affections of breeding, and the nervous susceptibility of lying-in women."†

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* Dublin Journal, vol. v. p. 61, Old Series.

† Gooch on the More Important Diseases of Women, &c., p. 127.

Attacks of puerperal insanity are not infrequent. Esquirol states, that of 600 women in La Salpêtrière, 52 were of this kind; and of 1119 cases admitted in four years, 92 were cases of puerperal mania. He found it even more frequent in proportion among the higher ranks, for out of 144 cases of mental derangement in females of opulent families, the attack came on during childbed or lactation in 21. Dr. Haslam states, that of 1644 females in Bethlem Hospital, 84 were cases of this kind; and Dr. Rush mentions 5 cases out of 70 at the Philadelphia Lunatic Asylum.

The attack may, in some few cases, be a continuance or a further development of the nervous affections of pregnancy; the nearer the approach to mental derangement during this period, the greater the probability of an attack after delivery.

There are two periods, however, at which patients seem especially obnoxious to it—1st, immediately after delivery, to which the term *paraphrosyne puerperarum* has been given; and 2ndly, about the fourth or fifth day, when the full secretion of milk is established, and then it has been termed *mania lactea.* Dr. Burrows adds a third period — about the fourteenth or fifteenth day, and he then attributes it to the effect of cold in checking the secretion of the milk. I find that of Esquirol's cases, 16 became delirious from the first to the fourth day; 21 from the first to the fifteenth day; 17 from the sixteenth to the sixtieth day; 19 from the sixtieth day to the twelfth month; and 19 after forced or voluntary weaning. Of Dr. Burrows' cases, in 33 the access was before the fourteenth day; in 11, after the fourteenth and before the twenty-eighth day.

SYMPTOMS.—The premonitory symptoms vary a good deal. In one sense, hereditary predisposition, or the nervous affections of gestation, are premonitory, but in most cases we shall generally find, previously to an attack, a degree of exhaustion, conjoined with great excitability, headache, and want of sleep; or the attack may accompany or follow convulsions, as I have seen in more than one case. Dr. Haslam remarks: "The first symptoms of the approach of this disease after delivery are, want of sleep, the countenance becomes flushed, a constrictive pain is often felt in the head, the eyes assume a morbid lustre, and wildly glance at objects in rapid succession; the milk is afterwards secreted in less quantity, and when the mind becomes more violently disordered it is totally suppressed."

Writers speak of various species of puerperal insanity, principally of two, however,—those cases in which the form is melancholia, or mania, and those in which phrenitis, or inflammation of the membranes of the brain, exists; the former is the true puerperal mania, and may be distinguished into two varieties—those where fever is present, and those in which it is absent. "Mania," says Dr. William Hunter, "is not an uncommon appearance in the course of the month, but of that species from which they generally recover. *When out of their senses, attended with fever, like paraphrenitis, they will, in all probability, die;* but when without fever, it is not fatal, though it (*i.e.*, the fever) generally takes place before they get well. I have had several private patients, and have been called in where a great number of stimulating medicines and blisters have been administered; but they have gone on at another time talking nonsense until the disease has gone off, and they have become sensible. It is a species of madness they generally recover from, but I know of nothing of any singular service in it." "Putting together," says Dr. Gooch, "this statement of Dr. Hunter with my own experience, I extract from it the following meaning: that there are two forms of puerperal mania, the one attended by fever, or at least—the most important part of it—a rapid pulse; the other accompanied by a very moderate disturbance of the circulation; that the latter cases, which are very far the most numerous, recover; that the former generally die. This agrees closely with my own experience." Dr. Burrows states that he has not seen any case attended with fever, "except when coincident with the first secretion of milk or where inflammation of the breasts or other parts has occurred, or upon forced weaning where there has been abundance of milk." But this is far from being generally true. I have seen several cases in which mania occurred before the secretion of milk, and yet the pulse was very quick, and the skin hot, with thirst, loaded tongue, &c.

In the one variety we find the attack preceded by wakefulness, excitability, headache, and after a while the mind is evidently astray; the patient may be joyous or melancholy, singing and talking incessantly, or obstinately silent, suspicious of every one, fancying injuries and offences on the part of her husband or friends, and forgetful of her child. The heat of the body may be slightly increased; that of the head is generally so, with a partial pain and sense of pressure or tightness, throbbing in the temples, and noises in the ears. The skin is generally relaxed and moist, but discoloured; the face pale, the tongue whitish and loaded; the abdomen soft, and usually free from tenderness; the pulse weak and quiet; there is little, if any sleep, and but little thirst; the bowels are torpid, and the stools unhealthy, often offensive. In other cases we find the skin hotter, the pulse quick and small, the face often pale, sometimes flushed, the eyes red and vivid, and a delirium more resembling that of fever, with a brownish dry tongue, and sordes about the teeth.

Dr. Burrows has described an attack of puerperal mania, somewhat different from the above. "In every instance, this variety has come on before the fourteenth day from delivery; it is preceded by pervigilium, the ideas are at first rapid and confused, images like those of dreams appear, and the delirium is soon confirmed by these illusions being considered as realities, and the speech and actions corresponding with these impressions. The muscular powers are rarely violently exerted, though the patient frequently attempts getting out of bed, without any fixed object; on the contrary, she generally lies supine; the countenance is rather vacant; the eyes are half closed, or fixed on vacuity, and, when roused, follow some imaginary object; the tunica conjunctiva is often highly injected, and the pupils very little sensible to light; the head is hot; the skin soft and relaxed, and partial sweating about the throat and neck. She continually mutters incoherently; loses consciousness, except when suddenly or strongly urged; if spoken to, answers shortly, and perhaps rationally, but lapses directly into the former state of indifference; the pulse is quick and uncertain; bowels generally easily moved; lochia and secretion of milk suspended. About the fourth or fifth day the debility is greater; there is more coma; the pulse is quicker, smaller, and more unequal, with slight subsultus; picking at surrounding objects, or the bedclothes; averse from food or drink; insensible of evacuations; the tongue throughout presents nearly a natural appearance, though sometimes tremulous when protruded. It is usually fatal by the seventh or eighth day; and if the patient survive, chronic insanity commonly supervenes, and melancholia oftener than mania."*

That active inflammation of the brain or its membranes may occur during childbed is beyond question, but as it is very rare, and does not strictly belong to the question of puerperal mania, I shall not at present enter upon its consideration.

Thus, then, we may have an attack of mania supervening upon delivery, or occurring from the fourth to the fourteenth day, with or without precursory symptoms; in two varieties the main distinction appears to be in the pulse—in one it is quick, in the other natural; the third variety resembles low fever.

The state of the uterus is apt to be overlooked, because there are but few symptoms, if any, referrible to it, and partly also because the patient is not always able to answer questions rationally. As far as my own experience goes, I should say that—1, in certain patients no uterine complication occurs at all; 2, that in others, the uterus becomes involved in the course of the maniacal affection; and 3, that in some we may trace distinct marks of uterine disorder from the commencement, such as suppressed milk, offensive lochia, and tenderness in some part of the uterus. I suspect, moreover, that a division of these classes into two will correspond very closely with Dr. Gooch's classification by the pulse; the first class, and part of the second, presenting almost always a quiet pulse; the severer cases of the second, and all the third, having the pulse rapid, with high fever.

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* Commentaries on Insanity, p. 371.

In all the varieties the stomach and bowels are much disordered. The character of the mania is not in any way peculiar to childbed.

The *progress*, *duration*, and *termination* of the attack vary a good deal in different patients. Dr. Burrows observes, that sometimes the slighter attacks which occur immediately after delivery will disappear under the operation of a smart purgative, and an opiate. Of the 92 cases given by Esquirol, 55 recovered: 4 recovered in the first month, 7 in the second, 6 in the third, 7 in the fourth, 5 in the fifth, 9 in the sixth, 15 between the sixth and twenty-fourth, 2 after two years. Of these, 38 recovered in the first six months. Of 37 cases given by Dr. Burrows, 35 recovered: 9 recovered in the first month, 5 recovered in the second, 5 in the third, 3 in the fourth, 2 in the fifth, 4 in the sixth, 1 in the seventh, 2 in the eighth, 1 in the ninth, 1 in the twelfth, 1 in the fourteenth, and 1 in the twenty-fourth month—that is, 28 recovered in the first six months. Of 80 cases by Dr. Haslam, 50 recovered.

But it may continue much longer. Of the cases described by Esquirol, 6 died: 1 six months after delivery, 1 in a year, 2 after eighteen months, 1 in three years, and 1 in five years. In Dr. Burrows' table, it is stated that 1 recovered after two years, 1 after three years, 2 after four years, 1 after six years, and 1 after seven years; but he says that he never met with one permanently fatuous from puerperal insanity. Of Esquirol's 92 cases, 6 died, or 1 in 15. Of Dr. Burrows' 57 cases, 10 died, or 1 in 6; 7 within twelve days of the access of delirium, 2 within seven days, and 1 after four months. Two of them had active uterine disease, and two others died of relapses after they had recovered from puerperal mania. Thus we find that the number of cases that recover is very considerable; out of 229, 146 recovered, or more than one-half. Of 90 of those who recovered, 66 were cured within six months, and the remainder at irregular intervals up to two years. Some we find continued insane much longer, remaining so for four, five, six, and seven years. But, on the other hand, a large proportion of deaths has sometimes occurred: 1 in 15 at La Salpêtrière, and 1 in 6 among Dr. Burrows' cases.

I do not think, however, that any statistics from a lunatic asylum can be taken as a correct standard of the mortality in puerperal mania, for patients are not sent there until the disease is more or less chronic; now, a great number of those who recover do so within a short time after confinement, as in two cases I witnessed lately, both of which recovered from the delirium within ten days. Among the better classes, a patient would not be placed in an asylum until she had recovered from her confinement, and until the ordinary treatment had failed. On the other hand, death occurs in many cases within the month after childbed. "Mania," says Dr. Gooch, "soon after delivery, is more dangerous to life than melancholia beginning several months afterwards." He states, also, that none of his patients with a slow or moderately excited pulse died, whereas, in the fatal cases, the pulse was very rapid, though some with a rapid pulse recovered. In the two cases I have referred to, the pulse was very rapid, yet both recovered. "Nights passed in sleep, a pulse slower and firmer, even though the mind continue disordered, promise safety to life. On the contrary, incessant sleeplessness, a quick, weak, fluttering pulse, and all the symptoms of increasing exhaustion, portend a fatal termination, even though the condition of mind may be apparently improved. In the cases which I have seen terminate fatally, the patient has died with symptoms of exhaustion, not with those of oppressed brain, excepting only one case."*

I should myself lay great stress, in forming a prognosis, upon *the presence or absence of uterine complication*, as well as upon the frequency of the pulse. Any complication, indeed, must diminish the chance of recovery.

CAUSES.—I shall now consider the *causes* of this distressing malady. There seems little doubt that in many cases (Dr. Burrows says in half the number, or possibly more, and Dr. Gooch bears the same testimony) the predisposition is hereditary, and of course mental deviations during gestation render an attack of puerperal mania extremely probable. Sleeplessness, which so fearfully increases nervous irritability, seems a very general predisposing cause.

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* Gooch on Diseases of Women, p. 124.

Among the exciting causes we find cold, irritation, irregularities of diet, distress of mind, sudden mental shocks, frights, disordered bowels, excessive secretion of milk, and constitutional irritation thence arising, &c.; or the attack may form a part of or follow convulsions, as in a case which came under my care not long since.

Great stress is laid upon moral causes by the French writers. Esquirol, as I have before mentioned, states their frequency, compared with the physical, as four to one; and Georget mentions that out of seventeen cases, there were but two not proceeding from a direct moral cause. During the invasion of France, in 1814-15, eleven out of fourteen cases were from terror. British writers do not attribute so large an influence to this cause.

As to the *proximate cause* or *pathology*, it is not very easy to speak positively. I may allude to four different views on the subject: 1. From its occurring in many cases immediately after delivery, some have attributed it to disease of the uterine system. Fabret mentions a case of cancer which excited mania. Dr. Briere has related a case of mania from inflammation of the womb. Dr. Cooke discovered disease of the womb in two cases of puerperal mania. Dr. Burrows mentions having seen abortion and mania, the result of inflammation of the womb, in two cases in which he was consulted; one died, and the other recovered; and in two of the deaths in his table there was disease of the uterus, but whether it preceded the mania or not does not appear. In one of the species of puerperal mania described by Dr. Burns, he says, "the delirium is connected with the state of the uterus, particularly of the veins which are inflamed."* At a meeting of the Obstetrical Society of Dublin, Dr. Montgomery mentioned a case of puerperal mania in which the uterus and ovaries were found in a state of inflammation; and Dr. Hardy another, in which peritonitis existed, but was not suspected till after death. I have certainly seen uterine inflammation follow puerperal mania, but that it existed previously I cannot say; the usual symptoms were absent. Still these cases, which are all I have been able to make out, form so very small a proportion to the cases in which there has been no disease of the womb, that without denying that the condition of the uterine system is in some way connected with puerperal mania, it is clear we cannot attribute it solely to organic disease of that organ.

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* Midwifery, p. 619.

2. Other writers regard the disease as inflammation of the brain or its membranes. Now it is granted, of course, that such cases do occur, but they are rare; and it is contended that in ordinary cases puerperal mania does not arise from inflammation, and the results of *post-mortem* examinations are in favour of the latter opinion. Burns, Campbell, Davis, Lee, and others, speak of it as a modification of phrenitis; Burrows, Pritchard, Gooch, &c., as not being inflammatory. The latter distinguished observer thus gives the result of his experience: "In No. 1, the disease occurred in a pale lady, without any heat of skin or much quickness of pulse, and was not relieved by loss of blood. In No. 3, it occurred in one whose constitution was drained and enfeebled by nursing. In No. 4, it occurred in a pale woman, habitually hysterical, subject to bear dead children, for want of power to afford them life for nine months. In No. 5, it occurred in one in whom, for urgent reasons, the circulation had been reduced to the lowest ebb consistent with life. In No. 7, in one who had been living very low for a week, with such marked symptoms of the irritation of debility, that at first I thought it was the close of some disease that had been overlooked. It was speedily relieved, not by cupping and purging, but by the tranquillizing and sustaining power of opium. In No. 8, the disease was treated, though with all possible prudence and moderation, as an inflammatory state of the brain, by leeches, cupping, purging, and low diet; yet the patient died, not with symptoms of oppressed brain, but with those of exhaustion; and on examining the body, the whole venous system was found extraordinarily empty of blood. In No. 10, the patient fell as if shot, under the stroke of the lancet; and on examining the head, there was found no effusion, and empty bloodvessels. In No. 11, the disease came on after puerperal convulsions (a disease generally, but not always, depending on cerebral congestion), and after one of those enormous bleedings commonly practised in these cases, and no morbid appearances were discovered after death in the brain. These cases, if fair specimens of puerperal insanity, lead straight to the conclusion that the disease is not one of congestion or inflammation, but one of excitement without power."* Add to this, that Esquirol found no traces of cerebral inflammation upon most careful examination.

3. Dr. Marshall Hall believes that the disease "results, in general, from all the circumstances following parturition combined, but chiefly from the united influences of intestinal irrita-

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* Diseases of Women, p. 144.

tion and loss of blood." "I am persuaded," he adds, "that real puerperal phrenitis is comparatively a rare disease, that puerperal mania is seldom of an inflammatory character, and that it is especially to be treated by those measures which are suited to the mixed case of intestinal irritation and exhaustion."* That many cases occur in patients exhausted from some cause, the extract I have given from Dr. Gooch will prove, and that the stomach and bowels are disordered in most cases is recorded by almost all writers, so that we cannot deny that Dr. M. Hall's view has much to support it. Nevertheless, it does not seem to express the whole truth, nor is the want easily supplied with any degree of precision.

4. The explanation of Dr. Gooch, which I have already quoted, as to the peculiar nervous susceptibility induced by the organic changes consequent on impregnation and child-bearing, although I believe it to be correct, is necessarily vague; nor is the view of Dr. Ferriar more accurate. He says: "I am inclined to consider puerperal mania as a case of conversion. During gestation and after delivery, when the milk begins to flow, the balance of the circulation is so greatly disturbed as to be liable to much disorder from the application of any exciting cause. If, therefore, cold affecting the head, violent noises, want of sleep, or uneasy thoughts, distress a puerperal patient before the determination of blood to the breasts is regularly made, the impetus may be converted to the head, and produce either hysteria or insanity, according to its force or the exciting cause."

Perhaps it is best simply to enumerate the elements which may concur to produce the attack. We have the nervous shock varying in degree, but always increasing the nervous irritability; the great vascular change; the disturbance of respiration and circulation; the exhaustion; and in many cases the loss of blood; this combination must necessarily leave the nervous system in a favourable state for the operation of the exciting causes I have enumerated, and the result is mania.

TREATMENT.—The treatment of puerperal mania is very simple as regards the materials, yet requiring calmness and judgment in their application.

1. Those who regard it as any modification of phrenitis, of course recommend bloodletting, with more or less liberality. Now, from what I have said as to the nature of the disease, it will be clear that in most cases it is inadmissible, or, if ever used, it must be with extraordinary caution, and by means of leeches,

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* Diseases of Females, p. 251.

in cases where there is strength and quickness of pulse, and flushing of the head and face. I have, however, never found it advisable; and Esquirol, Haslam, Gooch, Burrows, and Pritchard, are all opposed to it. The last-named author remarks: "If we consider that the greatest danger to be apprehended for patients labouring under puerperal madness arises from a state of extreme exhaustion, that many women die from this cause within a short interval from the commencement of the disease, and that, if they survive this period, the healthy state of the mind is in most instances restored, it will be evident that our chief endeavours must be directed to the present support of life." "Bloodletting, as a general remedy for puerperal madness, is condemned by all practical writers on whose judgment much reliance ought to be placed."*

2. When the stomach is overloaded, when indigestible food has been taken, or even for the purpose of lowering the pulse by the shock of vomiting, emetics have been found useful. They must, however, be used with caution when the face is pale, the skin cold, and the pulse quick and weak. Dr. Gooch prefers ipecacuanha to antimonials. Dr. Burrows recommends nauseating doses of tartar emetic, with the saline mixture and digitalis, for the purpose of reducing the violence and fury of the patient; and Dr. Beatty informs me that he has derived great advantage from tartar emetic.

3. From the almost universally disordered state of the bowels, great relief is afforded by one or two brisk purgatives of calomel, followed by castor-oil or Gregory's powder. The stools are dark-coloured, and highly offensive; and in addition to the advantage of clearing out the bowels, purgatives act admirably as derivatives from the head.

4. After the bowels have been freed, the greatest benefit will be derived from narcotics. Denman prefers small and repeated doses of opiates, but Gooch, Burrows, and Pritchard recommend full doses, and with this I concur: ten grains of Dover's powder, twelve drops of black drop, or an equivalent of the other preparations of opium. If opium disagrees, hyoscyamus must be given; and should sleep be induced, repeated small doses may be administered; when the head is very hot, and face flushed, we should postpone the exhibition of opium; and we must guard against constipation.

In more than one case recently under my care, in which opiates had no effect in quieting the patient or procuring sleep, we tried the inhalation of chloroform, and with great benefit: the patient became quiet, ceased talking, and occasionally was put to sleep for an hour or two at a time. Mr. Waters, of Liverpool, has published three cases of this disease, in which the exhibition of chloroform was most beneficial: all recovered speedily.*

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* On Insanity, p. 313.

5. The head may be shaved, and a cold lotion applied; if the delirium continue, a blister may be applied, but it is not generally necessary.

6. In protracted cases, or when the patient is exhausted, nourishing diet, broths, &c., and even tonics, must be allowed; ammonia, with cinchona; oil of turpentine, wine, &c.

7 As uterine inflammation not uncommonly arises in the course of or follows puerperal mania, a close watch should be kept for the earliest symptoms, and if they appear, calomel in small and repeated doses, or mercurial inunction, should be added to the other remedies, with such local applications as may be deemed advisable.

8. It will be necessary to keep the most careful watch upon the patient; the nurse, who ought, if possible, to be one familiar with such attacks, should never leave the room; friends ought to be absolutely refused admission; the apartment kept slightly darkened, and the entire house perfectly quiet.

9. When the mania disappears, and the patient is convalescent, a change of air and scene is most advisable.

CHAPTER XXXII.

EPHEMERAL FEVER, OR WEID.

This is a short attack of fever, to which females are especially liable during the early part of their convalescence, though it may occur at a later period. Women of sensitive constitutions are the most obnoxious to it.

Causes.—The most frequent cause is the impression of cold, perhaps on rising from bed, or changing the room, &c. Indigestion, or irregularity of the bowels, may also give rise to it. Fatigue, mental agitation, and want of rest, are also enumerated among the exciting causes.

Symptoms.—The attack commences by general uneasiness, palpitation, and shivering, with headache, pain in the back and limbs, soreness of the breasts, thirst, rapid, and sometimes irregular pulse, &c. "On or before the approach of the disease," says Dr. Campbell, "the patient is observed to yawn and stretch herself greatly, and to appear very languid. To this succeeds a sensation of cold, first between the shoulders, and thereafter along the spine, and at last it becomes general over the whole body, attended with pain in the head and large joints. Sometimes a sense of soreness is felt in the uterine region, and if the lochial discharge be present, both it and the milk are diminished in quantity."* To this succeeds a well-marked hot stage, with flushed face, throbbing temples, pain over the eyes, rapid full pulse, pain of the breasts, soreness of the abdomen, &c., and it terminates in a profuse sweat, which removes the fever, and relieves the other symptoms. The tongue is coated, the stomach is often disturbed, and the bowels confined. During the paroxysm, the fever often runs very high, and the distress is proportionally great. Occasionally the mind is confused and distressed, and in some cases the patient is delirious. For the time, the secretion of milk is diminished or suspended, and the lochia also; but they return after the paroxysm.

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* Journal of Psychological Med., No. 5, Jan. 1857, p. 123.

The fit is generally completed in twenty-four hours, always in forty-eight, and, if properly treated, it seldom returns; if neglected, however, it may assume the form of an intermitting, or continued fever. "It consists of a cold, hot, and a sweating stage; but if care be not taken, the paroxysm is apt to return, and we have either a distinct intermitting fever established, or sometimes from the co-operation of additional causes, a continued and very troublesome fever is produced."† Unless it assume this character, it is of very little consequence, and very easily managed.

Diagnosis.—From the violence with which it commences, it may easily be mistaken for puerperal fever; but the cessation of the paroxysm after some hours, and the absence of marked abdominal tenderness, will generally enable us to distinguish it. Indeed, the peculiar violence with which it commences is itself more characteristic of weid than of puerperal. "The suddenness of the attack, the great irregularity of the pulse, the absence of all local pain except that of the head, the intensity and irregularity of the succession of the different stages, will distinguish this from every other puerperal affection."‡

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* Midwifery, p. 341.

† Burns' Midwifery, p. 572.

‡ Campbell's Midwifery, p. 541.

Treatment.—During the cold stage, hot bottles and warm bed-clothes may be applied, so as to relieve the distress. Warm drinks and cordials may also be given.

During the hot stage a comfortable quantity of clothing must be continued, and diaphoretics given, so as to favour perspiration; and during the sweating stage, we must guard against cold, and diminish the clothing very gradually.

As for purgative medicines, which are necessary, I have found the combination of salts, senna, and tartar emetic the most useful; but any other purgative may answer the purpose. If the tongue be foul, and the stomach loaded, an emetic may be advisable.

Very rarely will it be necessary to take away blood, and then only if there be much local pain. A few leeches to the head, or to the breasts, if they be painful, may be of use; but in the majority of cases they are unnecessary.

We should carefully examine the state of the uterine system, as irritation may otherwise go on unsuspected, and be the cause of much subsequent distress.

The diet may be nutritious after the paroxysm is over, and mild tonics may be given, if necessary. Dr. Campbell recommends five-grain doses of camphor, four or five times a day, for some days, to allay nervous irritability. I prefer quinine.

Great care must be taken, after the fever has terminated, to avoid all occasion of cold, or any cause which may reproduce the attack.

CHAPTER XXXIII.

SORE NIPPLES.

This is a very frequent and troublesome occurrence, and far more painful than would be supposed. It is more frequent with first children, but some women suffer from it after each confinement. It comes on generally after two or three days' suckling, and continues for an uncertain time, after which it generally subsides.

Causes.—In the majority of cases, it is simply the reiterated application of the child which causes it, by removing the sebaceous secretion—so that the skin, when dry, contracts, slightly hardens, and cracks; or the nipples may be malformed—either "tucked in" or flat—and in either case the child will be certain to make them sore. This process is aggravated by a slight degree of inflammation. But sore nipples may be owing to the state of the child's mouth, as is frequently seen when the child suffers from aphthæ; and on the other hand, the discharge from the nipple may inflame and excoriate the child's mouth.

Symptoms.—At first the nipple and areola are observed to be dry, rough, and harsh; then a great number of minute cracks may be seen; or the surface becomes excoriated, and pours out a serous discharge, which in some cases is acrid, and spreads the excoriation to the surrounding skin. Or the nipple may exhibit deeper fissures, dividing it into two or three portions. Lastly, in some cases the nipple becomes ulcerated, and part, or nearly the whole, destroyed. Each attempt at suckling makes the nipples worse for some time, and occasions them to bleed. The torture to the patient is very great, and it requires all her fortitude to persist in nursing, at the cost of so much suffering.

But this is not all; for if the inflammation be great, it is propagated along the lymphatics to the mammary gland, and then gives rise to inflammation and abscess; and indeed, I believe this to be one of the most frequent causes of abscess.

Treatment.—To prevent this disorder the nipples should be washed with soap and water, and dried, and afterwards bathed with spirit and water, night and morning, during the last month of pregnancy. In many cases this will be successful. If the nipples be too flat, it will be well to apply a breast-pump to them occasionally, and always just before the child is put to the breast. A combination of white wax and butter is a popular remedy, and is often useful. Stimulating ointment, such as ung. hyd. nit., diluted with axunge, is sometimes of service; or the parts may be touched with burnt alum, nitrate of silver, or dusted with some mild dry powder.

When excoriations or "chapping" has occurred, spirit lotions may be applied, or one formed of sulphate of alum, zinc, or copper, acetate of lead, &c., dissolved in rose water; but the one I have found most effectual is a weak solution of nitrate of silver, to be applied after each time of suckling—care being taken to wash the nipple previous to the next application of the child. Mr. Druitt recommends a solution of five grains of pure tannin in an ounce of distilled water.* Dr. Johnson thinks highly of the following lotion and ointment, which may be applied alternately, or either alone:†

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* Braithwaite's Retrospect, vol. x.

† M'Clintock and Hardy's Midwifery, p. 14.

℞ Subborat. sodæ, ʒij.
Cretæ præcip., ℥j.
Spt. vini,
Aquæ rosæ, āā ℥iij. M. Ft. lotio.

℞ Ceræ albæ, ʒivss.
Ol. amygdal. dulc., ℥j.
Mel. despumat., ʒss., dissolve ope caloris, dein adde gradatim Bals. Peruvian., ʒiiss.
Ft. ung.

Drs. M'Clintock and Hardy speak highly of tincture of catechu in simple excoriated nipples.

In two cases of ulcerated or fissured nipples, Sir James Simpson drew the edges together, and covered them over with a pretty strong layer of the solution of gun-cotton. This maintained the edges so firmly together, that suckling did not re-open them, and consequently they soon healed. I have tried it, but with a less successful result. M. Bourdell has recommended the application of lint soaked in tinct. of benzoin, and repeated frequently, so as to form a coating over the sore. It is painful at first, but not afterwards.*

Various mechanical means have been contrived to cure the disease. Nipple shields of wood, ivory, or silver, may be procured, which, intervening between the child's mouth and the nipple, will often relieve the irritation altogether. But in many cases the child cannot draw the milk through them, and then we may have recourse to "calves' teats," properly prepared, or to a piece of chamois leather or vulcanized india-rubber, shaped and protruded in the form of a nipple, and pierced with many holes. If any of these plans succeed, the nipple will heal in a few days, and the child may be again applied to it.

Feeding the child two or three times in the day, or giving it to another person to nurse, will facilitate the cure, provided we do not allow the milk to accumulate too much, in which case inflammation may be excited, and terminate in abscess.

In very few cases is it necessary to give up suckling. Even if our remedies fail, the irritation will generally subside in a fortnight or three weeks.

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* L'Union Méd., 1858.

CHAPTER XXXIV.

INFLAMMATION AND ABSCESS OF THE BREAST.

Females are obnoxious to inflammation of the breast during pregnancy, after delivery, and at any period of suckling; but more especially with first children, and during the first three months of nursing.

Causes.—The irritation and congestion which take place from the secretion of milk vary in amount. If these be within certain limits, the secretion takes place with slight feverishness for a day or two; if beyond these limits, the breast becomes hot, tense, and painful, and unless the usual means reduce this irritation, it will run on into inflammation and abscess. This excessive congestion may be regarded as one of the most frequent causes of mammary abscess, soon after delivery, and with first children. Dr. Burns observes, "Some have the breasts prodigiously distended when the milk first comes, and the hardness extends even to the axillæ. If, in these cases, the nipples be flat, or the milk do not run freely, the fascia, particularly in some habits, rapidly inflames. Others are more prone to have the dense substance in which the acini and ducts are embedded, or the acini themselves, inflamed."* Exposure to cold, mental emotion, moving the arms too much at the time the breasts are so much enlarged, are all said to give rise to it. Inflammation very frequently extends itself from the nipples, along the lymphatics, to the deeper tissues, as already mentioned.

Symptoms.—The severity of the symptoms will depend upon the depth and extent of the inflammation. When the subcutaneous cellular tissue and the skin alone are involved, there will be some local pain and soreness, with a circumscribed hardness and tension, and a blush of inflammation upon the skin. But when the fascia or gland is involved, the pain is very severe, extending to the axilla; the swelling considerable, the tension great, and the constitution suffers proportionably. The pulse is quick and full, the skin hot; there are headache, thirst, sleeplessness, &c. The skin covering the inflamed part may be of a uniform red, or red in patches. If the gland be inflamed, the breast has a nodulated feel, as if it consisted of several large tumours. The secretion of milk is, at least for a while, suspended; but it will take place after the acute stage has somewhat subsided.

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* Midwifery, p. 623.

After the inflammation has continued some time, suppuration takes place, and the matter makes its way to the surface. This occurrence is marked by shivering, followed by heat and perspiration, and a sense of fluctuation in the tumour, which is prominent and smooth. The pointing is frequently in the neighbourhood of the nipple. By degrees the intervening substance is absorbed, and the cuticle giving way, the matter is evacuated. The matter of superficial abscesses is simple, or, as it is called, "laudable" pus; but when the abscess is more extensive, sloughs of cellular tissue and fascia are discharged. In a healthy person, when the matter has been completely evacuated, the abscess soon heals up, leaving only a degree of hardness for some time.

Such is the general course of the disease; but there are some important variations. "It sometimes happens," says Dr. Burns, "if the constitution be scrofulous, the mind much harassed, or the treatment at first not vigilant, that a very protracted and even fatal disease may result. The patient has repeated and almost daily shivering fits, followed by heat and perspiration, and accompanied with induration or sinuses in the breasts. She loses her appetite, or is constantly sick. Suppuration slowly forms, and perhaps the abscess bursts; after which the symptoms abate, but are soon renewed, and resist all internal and general remedies. On inspecting the breast at some point distant from the original opening, a degree of œdema may be discovered—a never-failing sign of deep-seated matter there; and by pressure, fluctuation may be ascertained. This may become distinct very rapidly, and therefore the breast should be carefully examined at least once a day. Poultices bring forward the abscess, but too slowly to save the strength, and therefore the new abscess, and every sinus which may have already formed or existed, must be at one and the same time freely and completely laid open; and so soon as a new part suppurates, the same operation is to be performed. If this be neglected, numerous sinuses form, slowly discharging fœtid matter, and both breasts are often thus affected. There are daily shiverings, sick fits, and vomiting of bile, or absolute loathing at food; diarrhœa, and either perspiration, or a dry, scaly, or leprous state of the skin; and sometimes the internal glands seem to participate in the disease, as those of the mesentery; or the uterus is affected, and matter is discharged from the vagina. The pulse is frequent, and becomes gradually feebler—till, after a protracted suffering of some months, the patient sinks."*

Treatment.—The first *indication* is to subdue the inflammation, and so prevent the formation of an abscess. For this purpose, the patient may be bled if the fever run high; or a number of leeches may be applied, and repeated if necessary, followed by a large soft poultice, or fomentations. When the bleeding has ceased, the poultice or fomentations may be continued, or an evaporating cold lotion substituted. "A convenient and simple mode of applying warmth is to immerse a wooden bowl in hot water, and having wrapped some flannel around the breast, place it in the bowl. By this means an effectual and equable warmth may be kept up for a considerable length of time."*

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* Midwifery, p. 625.

The bowels should be briskly purged by saline medicines, and their effect is much increased if tartar emetic, in moderate doses, be joined with them. "I have been in the habit of combating this affection in a way first communicated to me by my friend the late Mr. Gregory, who employed it with great success in the Coombe Lying-in Hospital. The remedy to which I allude is tartar emetic, whose power of controlling inflammatory affections of the breast would lead one to imagine that it exerted a specific action on the mammary gland. On the accession of inflammatory symptoms in the breast, after purging the patient, I administer this medicine in doses of one-sixteenth of a grain, repeated every hour, so as to induce slight nausea. It is never my object to cause free vomiting; and if this should occur, I omit the medicine for an hour or two, and then recommence its use at longer intervals. In ordinary cases I usually find, after twenty-four hours, that the pain and fever are mitigated, and the breasts are smaller and softer."† Indeed, this medicine has a more powerful effect in abating inflammation of the breast than any I have ever tried. The diet should be bland, and chiefly fluid. The milk should be gently drawn away at intervals, and the breast supported by a sling.

When we find that our efforts are unavailing to prevent the formation of matter, the second *indication* must be fulfilled. We must facilitate it as much as possible, and by no means can it be done more effectually than by constant poulticing—changing the poultice three or four times a day. Opium alone, or in combination with salines, should be given, to lessen the pain and induce sleep.

There is some difference of opinion as to the propriety of opening the abscess when the matter is detected. My own experience coincides with Cooper's rule: "Perhaps, as a general rule, the surgeon should never wait for an abscess of the breast to approach the surface, but make an opening as soon as the slightest degree of fluctuation is perceptible; for if this be not done, and the abscess is not very superficial, the matter will spread, and form sinuses in different directions.* Sir A. Cooper remarks: "If the abscess be quick in its progress; if it be placed on the anterior surface of the breast; and if the sufferings which it occasions are not excessively severe, it is best to leave it to its natural course. But if, on the contrary, the abscess in its commencement is very deeply placed—if its progress be tedious—if the local sufferings be excessively severe—if there be a high degree of irritative fever, and the patient suffer from profuse perspiration and want of rest, much time is saved, and pain avoided, by discharging the matter with a lancet."† When quite superficial, a longer delay may be allowed; but I am quite satisfied that it is better to open them than to allow them to open spontaneously. I have seen pyæmic fever follow the absorption of pus in a case in which the patient objected to its being opened; and from the symptoms which followed, I am more than ever persuaded of the propriety of evacuating the matter.

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* Earle, London Medical Gazette, vol. p. 153.

† Dr. Beatty, Dublin Journal, vol. iv .340.

After the matter is discharged, the diet may be improved; and if a considerable discharge continue, tonics may be necessary. The opiate at night may be continued for a short time, and then omitted. If the abscess be small, the child may suck the affected breast; but if large, it had better be artificially drawn, and the infant confined to the other breast. In some cases the child must be removed altogether, as the suckling may lead to abscess in the sound breast. When all inflammation has ceased, but the abscess still continues to discharge, especially in large ones, the cure will be hastened by strapping the breast with adhesive plaster, as recommended by Mr. Phillips, and by Drs. M'Clintock and Hardy.‡

When sinuses form, the only remedy is to lay them all open. It will require care to prevent the patient sinking. Wine, bark, and good diet will be necessary.

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* Cooper's Surgical Dictionary, p. 946.

† Sir A. Cooper on Disease of the Breast, p. 10.

‡ Pract. Observations, p. 16.

APPENDIX.

"OBSTETRIC MORALITY."

[I HAVE added the following essay as an Appendix because of the importance of the subject, and because I know of no English author who has entered as fully into the subject. I should be very sorry to be regarded as the *advocate* of craniotomy, but I may well contend for its employment in *certain* cases, inasmuch as I have always laboured to restrict their number, and to substitute the forceps when possible. The essay is reprinted nearly verbatim from the "Dublin Quarterly Journal," and I have thought it better not to alter its form.]

My attention having been called to an article in the Number of "The Dublin Review" for April, 1858, p. 100, on "Obstetric Morality," I have thought the subject of sufficient importance to bring it before the Obstetrical Society. The article is written to show the immorality of the operation of craniotomy under any circumstances, if the child be alive; and although the question has been repeatedly debated in former times, yet as it is comparatively new to the present generation, it appears to me very desirable that those who are now practising midwifery, and those who are preparing to practise it, should know the precise reasons for admitting or rejecting the operation.

I have read the review over very carefully several times, as dispassionately as I could, and I am free to confess that I am satisfied neither with the theological nor obstetrical reasoning of the author: I strongly suspect, indeed, that the writer is not a medical man.

If any apology be needed for *my* taking up the subject, I trust it will be found in the fact that one of my works (conjointly with Dr. Maunsell's) is taken as the exponent of this "Obstetric Morality." Of the tone of the review towards myself, though somewhat uncharitable in its imputation of motives, I make no complaint; but I should have preferred the third edition of my work being taken as the expression of my present views, instead of the first edition, published sixteen years ago.

In the observations which follow I shall discard all personal feelings, and simply confine myself to the question in debate, and I shall endeavour so to treat the subject as to give no offence to those who may differ from me. In a mixed question like the present, it is perhaps improbable that all should agree, but in differing, it is surely possible that each may give the other credit for the highest motives, and respect him for his conscientious adherence to what he thinks right.

The question at issue—the morality or immorality of destroying a living child by craniotomy—has always been regarded in a threefold aspect, moral, theological, and obstetrical, the latter resting on and inseparably connected with the former, at least in the opinion of one party; so that, although this is not the place for a moral or theological dissertation, nor I the most competent person to undertake it, yet it is impossible to avoid the subject entirely. I shall, however, confine myself to a short statement and examination of the arguments: with this advantage, that the reviewer, having based his theological reasons upon Holy Scripture, an authority to which I implicitly bow, we have, so far, common ground.

I. In the first place, the reviewer objects to the destruction of an unborn babe on the grounds that it is a breach of the sixth commandment, "Thou shalt do no murder;" and also that it is contrary to the denunciation in Genesis ix. 6—"Whoso sheddeth man's blood, by man shall his blood be shed, for in the image of God made He man." If the latter text be more than authorization of capital punishment for murder, which I do not deny, it is clear that it must be subject to limitation, otherwise it would prohibit killing in self-defence, or in defence of another, which is considered lawful by the Roman Catholic Church, and it would render war unlawful. If, then, it be thus modified, there is no reason why the limitation may not be extended so as to include the operation in question, provided I can show that it cannot justly be considered a breach of the sixth commandment.

What, then, constitutes *murder*, and in what does it essentially differ from *killing* or *homicide*? For our present purpose we shall derive the best assistance from the law of the land, which is the highest practical exponent of the law of morals. I am indebted to a distinguished legal friend for the following definitions:—"Murder is the killing any person under the king's peace with *malice prepense, or aforethought*, either express or implied by law:" so say Lord Coke, Sir Matthew Hale, Sergeant Hawkins, &c. "Of this description, the *malice prepense, malitia precogitata*, is the chief characteristic, the grand criterion by which murder is distinguished from any other species of homicide."* "It should, however, be observed, that when the law makes use of the term *malice aforethought* as a description of the crime of murder, it is not to be understood merely in the sense of a principle of malevolence to *particulars*, but as meaning that the fact has been attended with such circumstances as are the ordinary symptoms of a *wicked, depraved, and malignant spirit*, a heart regardless of social duty, and deliberately bent upon mischief."†

This malice may be either *express or implied by law*. Express malice is when one person kills another with a sedate, deliberate mind and formed design; such formed design being evidenced by external circumstances, discovering the inward intentions, as, lying in wait, antecedent menaces, former grudges, and concerted schemes to do the party harm.‡

Malice is *implied by law* from any deliberate and cruel act committed by one person against another, however sudden; thus, when a man kills another suddenly, without any, or an inconsiderable provocation, the law implies malice, for no person, unless of an abandoned heart, would be guilty of such an act upon a slight or no apparent cause.§

I think it will be at once admitted that killing a child in utero, which can be *by no means born alive*, and which must die in a few hours, but the prolongation of whose life, even for those few hours, will most seriously, if not irreparably, endanger that of the mother, cannot be brought under the definition of murder; there is no malice aforethought expressed or implied; it is done from necessity, and without any evidence of a "wicked, depraved, or malignant spirit:" it is not therefore, in any true sense, murder. Had there been the slightest reason for thinking it so, I have no doubt that there would have been a provision made by law, just as there has been against criminal abortion: so far from this, "an infant in its mother's womb, not being *in rerum naturâ*, is not considered by law as a person who can be killed *within the description of murder*.||

Killing or Homicide is by law divided into three kinds: it is either justifiable, excusable, or felonious. It is *justifiable* where the killing arises from imperious duty prescribed by law, as the lawful execution of a criminal; or is owing to some *unavoidable*

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* Blackstone's Commentary, vol. iv. p. 198; Gustinean's Case, 1 Leach, p. 457.

† Justice Foster's Crown Law, pp. 256, 262.

‡ 1 Hale, 451: 4 Blackstone's Commentary, p. 199.

§ East's Pleas of the Crown, cap. v. sect. 2, p. 215; Blackstone's Commentary, vol. iv. p. 200.

|| 1 Hale, P. C., p. 433.

necessity, as in the case of an attack on life, property, or chastity, where the death occurs in self-defence. This is admitted by the Roman Catholic authorities, for I find in a little work, with the imprimatur of the Most Rev. Dr. Cullen, the following:—"It is not a sin to defend your own life or *another's life*, chastity, or property of great value, when unjustly attacked, even though it cannot be defended without taking away the life of him who attacks it."*

It is *excusable*—1. In case of death by accident, without any culpable neglect or default, and whilst engaged in lawful occupation or amusement. 2. When death occurs in protecting one's self from an assault, or the like, in the course of a sudden affray, where the slayer had no other probable means of escaping from his assailant.

It is *felonious* in the case of murder or manslaughter.

Now I shall be able to show that craniotomy, under proper circumstances, is "an unavoidable necessity," and if, therefore, it be legally justifiable to take one life for the protection of another, we have precisely the conditions applicable to our case, with this additional justification, that the life we take is forfeited, *i.e.* it will inevitably cease, as the child *cannot* be born alive.

It is the more important to be satisfied on this point, for it is clear that, so far as craniotomy is concerned, it must be decided on moral grounds, inasmuch as, whether the child dies in utero or is killed, *baptism is equally out of the question.*

There is an argument frequently used by the reviewer—"that we are not to do evil that good may follow," about which a few words may not be amiss. It is perfectly true as an aphorism, but used as the reviewer uses it, it is a *petitio principii*, for the "evil" is the very point in dispute. Again, what is meant by "evil?" Pain is an evil, yet we inflict pain to save life,—"doing evil that good may come." That, therefore, cannot be the meaning. It must be moral evil, something involving guilt, which would be unlawful.

Moreover, in the way in which it is applied by the reviewer, it is an accusation by implication; "we may not do evil," &c., which is what *you* propose to do. It may "be slanderously reported, and some may affirm that we say, Let us do evil that good may come;" but in the true sense of the word "evil," we repudiate the principle as strongly as the reviewer or the Roman Catholic Church.

II. But a second and graver objection, and one that seems to underlie the former, is, that in destroying the fœtus in utero we destroy both soul and body, because it cannot be previously baptized. It is only fair to give the reviewer's own words on this subject:—"It is no less certain that this soul, which has been created by God, and infused into the body at the first moment of existence, has, in the language of holy David, been conceived in iniquities, that is, that it has inherited the stain inflicted on all his posterity by the prevarication of Adam. Nothing defiled can enter into heaven, and the defilement of this soul can only be washed out in the waters of baptism. To it, in common with all mankind, have been addressed the words of the Saviour—'Unless a man be born again of water and the Holy Spirit, he cannot enter the kingdom of heaven." It is strange that those who profess to be guided exclusively by Scripture should deny that the external rite of baptism is necessary to salvation, for it is plainly and repeatedly inculcated in the Word of God. That the second birth by water and the Holy Ghost, spoken of in John iii., means the external rite of baptism may be inferred from the fact that our Lord's disciples soon after began to baptize, as we learn from the beginning of the following chapter. The word 'to baptize' signifies 'to wash:' and on the very last occasion on which our Lord addressed His Apostles after His resurrection, He told them: 'All power is given to me in heaven and in earth. Going therefore, teach ye all nations, baptizing them in the name of the Father, and of the Son, and of the Holy Ghost.' When the people were melted to compunction of heart by St. Peter's first sermon, they asked what they should do? 'But Peter said to them, Do penance and be baptized, every one of you, in the name of Jesus Christ, for the remission of your sins. They therefore that received his word were baptized.' That this baptism was by water is manifest by what occurred when Philip preached Jesus to the eunuch; for 'as they went on their way, they came to a certain water, and the eunuch said, See, here is water, what doth hinder me to be baptized? And they went down into the water, both Philip and the eunuch, and he baptized him.' Ananias told St. Paul, when sent to him by God, 'Rise up, and be baptized, and wash away thy sins.' So also, when St. Peter saw the Holy Ghost falling on the Gentiles, he exclaimed, 'Can any man forbid water, that these should not be baptized?' This idea is strongly conveyed in various places by St. Paul. 'Christ loved the Church,' he says, 'and delivered himself up for it, that he might sanctify it, cleansing it by the laver of water in the word of life.' Again, he calls the 'laver of water' the 'laver of regeneration, and renovation of the

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* What Every Christian must Know and Do, p. 23, note.

Holy Ghost,' alluding manifestly to our Lord's words (John iii.), and thus clearly establishing that the regeneration, without which no one can enter into the kingdom of God, is baptism by water. 'Not,' he says, 'by works of justice which we have done, but according to His mercy he saved us, by the laver of regeneration, and the renovation of the Holy Ghost.'"—p. 125.

Now, putting aside the question of when the soul is first joined to the body, on which subject Holy Scripture is silent, I am quite prepared to admit simply and implicitly the authority of the texts quoted. I do not deny that baptism was by water, nor that baptism is one of the sacraments "generally necessary to salvation;" but all these texts involve one condition—viz., the *possibility* of baptism. This, I think, must be admitted *primâ facie*, and I object to apply such texts to cases for which we have no shadow of proof that they were intended. It appears to me that the blessings of baptism, and the penalties for its neglect, can be and were intended only to apply to those children whose baptism was possible. The duty and the power must be correlatives. Now of children dying in utero nothing whatever is said in Holy Scripture, yet my reviewer deduces, from the texts above quoted, the doctrine that the souls of such children are lost. As I have said, I cannot give him textual authority for the contrary, but I can adduce an example which proves my point completely. When the thief on the cross said, "Lord, remember me when thou comest into Thy kingdom," the answer was, "This day shalt thou be with Me in paradise." Of *his* salvation, therefore, there cannot be the slightest doubt, and yet—he was not baptized.

Of course, if the reviewer had stated that the operation of craniotomy had been prohibited by the Roman Catholic Church, there would have been no necessity for argument.* The members of that Church would feel bound by its decision, and it would

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* I do not pretend to determine the exact authority of the following extract, although it is not improbable that it may have been the "exciting cause" of the review:—"Sedulam operam dent sacerdotes, ut quantum poterunt, impediant nefandum illud scelus quo, adhibitis chirurgicus instrumentis, infans in utero interficitur. Omnis fœtus quocunque tempore gestationis editus, baptizetur, vel absolute, si constet de vitâ; vel sub conditione, nisi evidenter pateat eum vita carere."—*Decreta Synodi plenariæ Episcoporum Hiberniæ apud Thurles habitæ, anno* 1850. Article, "De Baptismo," p. 20.

On the other hand, authorities are not wanting to justify the limited use of the operation. For example, in the learned work of Migne, "Theologiæ cursus completus" (Paris, 1839), at page 483 of vol. xiv., in a note we read as follows concerning remedies likely to cause the death of the fœtus:—"Licebit administratio remedii, ... si nulla spes affulgeat prolem baptizandi, nam salus matris ad minus tanti est quam salus temporalis et have been no business of mine to contest the point; but as he has made it depend upon reasoning from Holy Scripture, I have felt quite at liberty to question the accuracy of his conclusions.

The teaching of the Church of England and Ireland on the subject of baptism is to be found in her Book of Common Prayer, and is so accessible, and indeed so well known, that any detail is quite unnecessary here. She recognises baptism as one of the sacraments "generally necessary to salvation," and declares that "it is certain by God's Word, that children which are baptized, dying before they commit actual sin, are undoubtedly saved." But in accordance with her declaration that "Holy Scripture containeth all things necessary to salvation: so that whatsoever is not read therein, nor may be proved thereby, is not to be required of any man that it should be believed as an article of the faith, or be thought requisite or necessary to salvation:" not having found any expression as to the result to those dying unbaptized, when baptism is impossible, she is silent, content to leave their future lot to the loving-kindness and tender pity of Him who died for all.

Morally and theologically, then, the case stands thus:—My reviewer contends that destroying the child in utero is murder. I have proved, on the highest legal authority, that this stigma is unjust, and that it does not come under any true definition of murder, inasmuch as it involves no malice; that it is even something less than justifiable killing, inasmuch as the child's death is inevitable without our interference; we do but hasten it.

Again, he maintains that baptism being a sacrament essential to salvation, all children dying or destroyed in utero are lost. I say, on the contrary, that his authority from Scripture fails, inasmuch, as in the cases quoted baptism was possible; whereas in

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momentanea prolis, imo magis preponderat; illicitum erit, si spes probabilis affulgeat baptizandi prolem."

Again, if we turn to the works of St. Thomas Aquinas (Paris, 1839, vol. vi. p. 253), we find this sentence:—"Si certum esset, non adhibito remedio, fœtum cum matre periturum, et e contra certum aut probabile, adhibito remedio, matrem salvavi vi, multi existimant quod tunc liceret adhibere remedium, quia in his circumstantiis vix in æstimationem venit salus prolis certo perituræ, indeque jus habet mater sibi consulendi." It is only fair to say that St. Thomas is himself doubtful on the point, but it is quite enough for my purpose that "multi existimant."

Lastly, St. Alphonsus Liguori, in his "Homo Apostolicus," 1837, p. 186, says:—"Puto omnino tenendum . . . . præbere medicinam matri cum periculo fœtus animati licere in eo solo casu, quo nulla spes appareat rationabilis de prolis vitâ, ut possit baptizari, post matris mortem."

Now, one of two things is certain, either that I do not deserve the hard epithets the Reviewer has bestowed upon me with so liberal a hand, or that they apply with equal justice to these authorities.

these it is not, whether the operation be performed or not: and I have given one undoubted instance of salvation without baptism, where its administration was impossible. For my own part, whilst I feel the tenderest regard for the lives of these innocents, and would do my best to preserve them, if that fail, I have no fears for their souls for whom Christ died, but look forward with sure and certain hope to their resurrection to eternal life.

III. Now let us turn to the obstetrical side of the question: and our first endeavour must be to recognise, and in recognising to define, the limits of the responsibility devolving upon the accoucheur, both as regards the child and the mother.

No man possessed of common human feelings, particularly if he have children of his own, can fail to feel the utmost tenderness towards the feeble being he is to usher into the world. Even if we leave the soul out of consideration, the fact of a human life being involved will be sufficient to insure the utmost efforts of skill and attention. The accoucheur is responsible that no hygienic arrangement shall be neglected, no errors of management committed, and no assistance withheld, either during the labour or afterwards, which may tend to secure life and health to the child. The records of modern practice show how steadily this object has been kept in view. The improved management of the first stage of labour has shortened the duration of the second, by the prolongation of which the life of the child is threatened. The action of the second stage, when too tedious, is often quickened by the ergot of rye, and we are saved the necessity of a recourse to instrumental assistance. And when we are obliged to assist in this way, I am certain that in every case where there is a possibility of success, those instruments are preferred which involve no necessary injury to the child. A comparison between the relative frequency of operations with the forceps and crotchet at present and in former times, both in the Rotundo and other hospitals, will bear out the truth of this remark. And in all the modern text-books this rule is emphatically laid down. For myself I can truly assert that I have always taught this in my lectures and in my writings, and in practice I have rigidly followed the same principle, that the child is to be saved, if possible. I therefore demur to the reviewer's sweeping assertion, that we evince great indifference to infantile life. The saddest consummation of an anxious attendance is the necessity of *hastening* the death of an unborn babe, in order that the mother's death may not be thrown upon us also.

But although the reviewer says little about it, we must not forget that we are equally responsible for another life, the mother's, and that of immeasurable present value to her family and to society; and special precautions are accordingly taken. Much of the care to which I have alluded is equally for the benefit of the mother, and if some risk be occasionally incurred to secure a living child, extraordinary care is taken to render that risk as small as possible. The responsibility does not terminate with delivery, but extends until complete recovery. For one moment just look at the interests involved in this recovery. The husband, whose happiness is bound up in the life of his wife, and who has intrusted that to us; other children, it may be, whose well-being is dependent upon their mother; to say nothing of a circle of friends and dependents who look to her for comfort and guidance; and all these interests now hanging in the balance, form very onerous items in our calculation of responsibility.

Such responsibility we incur every day, in every case, but it is only felt as a heavy burden in difficult or impracticable cases. Then we feel that there must be some limitation to it, inasmuch as our power is restricted: we do not hold life and death in our hands—we do not determine the character of the labour. What, then, are those limits beyond which our responsibility does not extend? It appears to me, that *our responsibility is exactly in proportion to our command of the essential conditions of success.* Not that we are responsible for success, for that depends upon a Higher Power; but that, as far as we are concerned, all the means of success at our command shall be applied in a manner and at a time most likely to insure it. Now the first and most essential condition, both for the mother and the child, is *timely delivery,* and if we have the power, we are responsible for its exercise in such a manner as will benefit both. Suppose, for example, a case of powerless labour, suitable for the forceps; if we carelessly allow the labour to continue so long as to involve the death of the child, we are as much responsible for its death as if we had recourse to destructive instruments, instead of delivering it by the forceps.

But if it be *physically* impossible that the child can be born alive, then I hold that the accoucheur's responsibility for its life ceases entirely—no blame can rest upon him for its death. Nor do I believe that he can be held responsible in the ordinary meaning of the term, although, in the case supposed, he has to hasten the child's death to secure another life, for which, so far as delivery is concerned, he is unquestionably, and in the fullest sense of the word, directly responsible.

For I would beg you to consider seriously the different position in which we stand as regards delivery, towards the child and towards the mother. Delivery is essential to the safety of both; it *may* be incompatible with the life of the child, but it *can* always be accomplished before the life of the mother is seriously compromised. Having, therefore, the command of the essential condition of success, the full responsibility rests upon us, that so far, the mother's life shall be insured; and as all responsibility for the child has ceased, we say that the mother becomes our sole object.

It is the due appreciation of these relative responsibilities in difficult cases that distinguishes the wise and experienced accoucheur: he preserves a just equipoise between them so long as it is possible to fulfil both, and recognises the proper moment when one ceases. *One*, I say, not *either:* for I protest, as strongly as my reviewer, against the notion which he attributes to *us*,[*] that we *choose which of the two lives we shall save*—a notion as false in theory as it is in practice. No man *dare make such a choice*, for we have neither the necessary knowledge, nor the right, nor the authority, to decide which is the more important life, and best worth preserving.

And *no one ever does make such a choice.* Perhaps the least suspicious evidence I can adduce is to refer to the cases to which, in my own book, the operation of craniotomy is said to be applicable. You will find that, in all, the child is either presumably dead, or the labour is mechanically impracticable with safety to the child. So that, without hesitation or limitation, I would lay it down as a canon, that *craniotomy is never to be contemplated when a living child can, by any means compatible with the safety of the mother, be delivered "per vias naturales;"* and upon this rule I invariably act.

This rule happily limits the number of such painful cases; yet, although not numerous, instances do occur in which I believe craniotomy to be not only necessary and justifiable but imperatively demanded, even though the child be alive, if we would not voluntarily incur the responsibility of the mother's peril, and perhaps death: and upon this class of cases I shall trouble the Society with some observations in answer to my reviewer. He especially refers to cases of mechanical disproportion from narrowness of the pelvis, and from a hydrocephalic head. Both these classes, and some others, involve merely questions of mechanical disproportion, and may, for our present purpose, be treated together; but I shall add a few words separately on hydrocephalic children.

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[*] The Reviewer states that "this seems to have been the opinion of the French doctors who attended the Empress Maria Louisa during her accouchement, for they consulted the first Napoleon as to whether they should spare the mother or child, in case they found it necessary to kill one of them." I believe that this is about as true as the phrase attributed to General Cambronne—"Les guides meurent mais ne se rendent pas," or Wellington's "Up, Guards, and at them," both of which were denied by the supposed authors. In truth, M. Dubois was too experienced a man to make such a speech; if anything *like it* was made, it was, probably, a request to know whether the mother was to be *allowed to die, because the child could not be born alive.* And let me just remind the Reviewer, in any case, that the parties were of his own Church.

Now in order to meet the question fairly, I shall *assume* that we have to deal with the case of a pelvis so narrowed at either brim or outlet that a living child, even aided by the forceps, cannot pass, but through which a mutilated child can be extracted, without undue risk of injury to the mother; and it matters little to the argument whether the difficulty be from deformity of the bony tissue, from a fixed irreducible tumour, or from excess of bulk on the part of the child. I say I must *assume*, for the sake of the argument, such a case, although I am met at the outset by the objection on the part of the reviewer, that in practice we cannot be sure of such cases, for that there is little certainty, and no uniformity, in the measurements given by authors: that, in fact, they are not agreed about the size of the aperture through which a living child *cannot* pass. This is certainly true, though the difference is not great, and it is a difficulty which would be seriously felt in many cases if we had to give an opinion *à priori*, or before the commencement of labour. But after labour has commenced, the position of the accoucheur is quite changed, and he has acquired new and decisive means of forming a correct judgment. He can compare the size of the aperture with the size of the child's head, for they are in close apposition: he has the evidence of what hours of strong pains can do towards forcing the head downwards; nay, more, he can test the applicability of the forceps, whether they can be introduced, and whether, when introduced, he can draw down the head. With these advantages I undertake to say that no man will find any difficulty in deciding whether a patient can be delivered without craniotomy or not.

Let me now remind you of the course of a labour of this kind when left to nature. During the *first stage* no bad symptoms appear, nor for some time after the commencement of the *second*, nor is the child in present peril; but after a time somewhat varying and uncertain, indications of constitutional suffering are developed,—the symptoms of powerless labour, in short,—and from that moment the mother may be said to be in danger, which is fearfully increased by every hour's delay and suffering. In process of time the symptoms become still more formidable, and involve so much general derangement that the evil effects continue after delivery; and if this be not effected, the patient will ultimately die in a state of coma or convulsion, or, perhaps, before this final stage, the walls of the uterus may give way whilst we are waiting, and death result from the laceration. If the woman be delivered within a reasonable time after the setting in of unfavourable symptoms, they shortly disappear, and her recovery will, in almost all cases, be complete. If the labour be allowed to continue, and exactly in proportion to the delay, the recovery will be less favourable, and the danger after delivery greater, until we arrive at that point of time when delivery itself cannot save the mother. At what period of the labour the death of the child, which is inevitable, will occur, it is impossible to state with any accuracy. It does, doubtless, sometimes take place comparatively early, perhaps before any very bad symptoms have set in; but I feel little doubt that, as a general rule, it is not until a much later period, in fact not until the mother is in imminent peril, in many cases not until the last stage.

Now, what is the right and proper thing to be done in such cases? The child we shall assume to be living, but it is physically impossible to extract it alive through the passages. The mother is in great danger, which increases rapidly, and they will inevitably both die if left alone. We may (at least for the present) dismiss the question of baptism, as that is impossible, whether we craniotomize or not, and there are two courses open to us:—1. To wait until we may reasonably suppose the child to be dead, and then perforate and deliver, regardless of the consequences to the mother; or 2. To perforate as soon as the bad symptoms set in, after having assured ourselves of the impossibility of using the forceps, and so secure the life of the mother. The reviewer indicates a third method, the Cæsarean section, which I shall examine presently. In our choice of these two methods the reviewer and I are at issue; the conclusions at which we arrive are diametrically opposite. He chooses the first, and rejects craniotomy so long as the child is alive. "But it will be said," he observes, "must the accoucheur fold his arms and allow both mother and child to perish, when he might, probably, save one of them? To this we answer, once more, that he cannot commit murder; that he must not do evil in the hope that good may follow; and that the medical man, like every other member of society, must be prepared to encounter in this dim world a great many calamities which he can neither remedy nor alleviate." Now, I have shown that we do not commit murder. I agree fully in the rule that we are not to do evil that good may follow, but the reviewer's use of it in this place is plainly a "*petitio* *principii,*" for I deny that we do evil—that is, morally—or involving guilt; and that "doctors have to encounter many calamities in this dim world which they can neither remedy nor alleviate," is undoubtedly true, but *is* this a case in which the doctor can shelter himself under the comfortable conclusion that "he *can* neither remedy nor alleviate it?" Is it not quite evident that his voluntarily refusing to deliver makes him an active, willing, and responsible accomplice in the death of the mother?

I have no hesitation in stating my deliberate opinion, that the second plan, which has received the sanction of the best and most distinguished men in the profession, is the right and the wise course to adopt, and the one which best adjusts and preserves the balance of our responsibility. For, in the first place, I have proved that the destruction of a child under such circumstances is not murder, but justifiable in law. Nay, if you think a moment, one cannot say that the blame of the child's death rests upon the accoucheur at all, for that is inevitable if he do nothing. All he is justly answerable for is depriving it of life a few hours before it would otherwise cease to live. And for what? The mother is in imminent danger, and will die if assistance be withheld, but she *can be saved now.* I say, therefore, that if this assistance be not given, the accusation of murder (by omission) would come with greater force against the party who voluntarily allows the mother's life to be imperilled. Take lower ground, if you like, than the abstract question of right. Granted, if you please, that hastening the child's death is an evil, so is the death of the mother; which of the two is the lesser evil, considering that you *cannot* prevent the first, and *can* prevent the latter?

No good man will forget that for all his deeds he is responsible to God; but for our professional actions we have the additional tribunal of professional and public opinion. Narrow the circle still further, and it is clear that each of us is specially answerable to the party who has intrusted us with the lives most dear to him. The latter has the most direct and deepest interest in both the objects of our care, and it appears to me that it is impossible to ignore *his* right to be a party to whatever decision we come to.

Suppose it be our painful duty to announce to the husband that the labour is such that the child *cannot* be born alive, but that it must be destroyed if we hope to save the mother; nay, that if we wait until it die, the mother will only be so much the worse. Are there many husbands that would hesitate? Would not natural feeling and common sense lead him to decide that, the child's safety being impossible, the mother's safety should be secured? If this be the case, the accoucheur who refuses to act must be prepared to meet the responsibility he thus incurs towards society. Admitting fully that a man's conscience must be his guide, I do not think in a case like the present he can always be at liberty to ignore the consciences of others.

I have thus endeavoured, I hope not unsuccessfully, to define the position in which we stand as regards the mother, in cases where the child cannot be saved. I have shown that the responsibility which has ceased for the life of the child, has thereby, as it were, doubled in behalf of the mother; that quiescence on our part cannot be considered as a submission to necessity, or to the decrees of Providence; but that, whether we interfere or not, we are equally voluntary, intentional, and active agents. That in hastening the death of the child, we in no sense incur the guilt of murder, nor are we fully responsible for its death, which, with or without our interference, must have ensued; but that if we, by waiting for its death, imperil the mother, we are in the fullest sense responsible for that result.

But at this point I am met by the reviewer with a quotation from my own statistics to show, that the gain to the mother is not so great after all; for that 1 in 5 die after craniotomy. No doubt this is a very large mortality; but if the reviewer had been a medical man, or if he had taken the trouble to read the next sentence in my book, he would have found it explained as in many cases the result of the doctrine he is upholding, viz., the waiting until the child is dead, and the consequent increase of peril to the mother. In many cases, doubtless, the delay is voluntary; in others it arises from ignorance on the part of the poor, so that, when assistance is procured, the patient is too far gone for ultimate safety. I should be very glad to furnish a table of cases without complication, in which the operation was performed before the patient was too far reduced; but I fear that I shall not be able to adduce many. In Dr. Collins' Life of Dr. Joseph Clarke are given the records of his private practice, and I find that he performed the operation twelve times from mechanical disproportion (including one case of hydrocephalus), and all the mothers recovered favourably; yet the reviewer specially mentions that, of the same operation performed in hospital under Dr. Joseph Clarke, 1 in 3 of the mothers died; an ample confirmation of the explanation I have given.

In Dr. Robert Lee's "Cases in Midwifery" there are eighty cases of craniotomy recorded, under similar conditions to those I have indicated, viz., mechanical disproportion without complication, although Dr. Lee was not called in many of them until too long a time had elapsed; but, even so, only 4 died, or 1 in 20. Dr. Lee's character is a sufficient guarantee that the operation was the patient's only chance, and he expressly regrets that some of them were not delivered earlier; had they been, probably none would have died.

In the record of Mr. Crosse's practice there are 7 cases in which craniotomy was performed, and all the women recovered.

Dr. M'Clintock has met 5 cases in private practice in which the operation was required from disproportion, and all the mothers recovered.

In looking over my own case-book I find that I have never performed the operation in consequence of mechanical disproportion, in my own private practice; the only cases being two of excessive hæmorrhage, in which, there being no doubt of the child being dead, this operation was preferred to turning; and one case of convulsions, in which the child was already dead. But in consultation I have had recourse to craniotomy in twenty cases, shortly after it became evident, either that the child was dead, or that it *could not* be born alive; of these, all the mothers recovered well. In four other cases I was called in after the labour had been so protracted that the mother's case was hopeless, and the operation did not save them; these, therefore, I exclude.

From these cases, though their number is more limited than one could wish, I think we may fairly conclude that if the operation be performed as soon as it is imperatively demanded, and before the mother is run down, it is not attended with greater danger than must always be anticipated from any great operation, for it appears that out of 124 cases, some of which were unduly prolonged, only four women died, or 1 in 31, *i.e.*, 3 per cent. Nay, more, Dr. M'Clintock showed, at a recent meeting of this Society, that of the two modes of delivery, by the forceps, and by craniotomy, the latter, *cæteris paribus*, is the safer for the mother.

With regard to M. Debreyne's experience, quoted by the reviewer, that "it is almost always fatal to the mother," if it be more than one of the loose expressions occasionally used by writers, I can only say that it speaks volumes against M. Debreyne's practice and that advocated by the reviewer, for I have shown that the excessive mortality results from unreasonable delay.

Now let me say one word upon children with hydrocephalus. These cases come under the same law as those of which I have been speaking, *i.e.*, the law of disproportion or of relative bulk. The reviewer declaims strongly against perforating them, because, as he says, such children have been born alive. No doubt this is true, but the cases are few; in the greater number the child is dead, or has been necessarily destroyed. But their life or death does not determine the use of the perforator; if the head be not too large to pass through the pelvis, we should no more think of destroying the child than if it were deformed in any other way: if, on the other hand, it cannot pass, it must be opened for the same reasons as we perform craniotomy in distorted pelvis. Probably the reviewer was not aware that such cases, when let alone, involve serious danger to the mother: yet of seventy cases collected by Dr. Keith, in sixteen there was rupture of the uterus, and death. The same result followed in five cases related by Dr. R. Lee.

So far, I have assumed that we have only a choice between the two methods of dealing with these cases: that there is no alternative but destroying the child, or allowing it to die; but the reviewer maintains that there is, and, if I understand him, that it ought in all cases to be the substitute for craniotomy. He says that "when it has been proved by *experience* and to an absolute demonstration, that a full-sized child cannot be born alive, the induction of premature labour ought undoubtedly to be adopted. The only lawful alternative is the Cæsarian section, and this itself is so formidable and dangerous, that, when it can be foreseen, and its necessity avoided by any lawful and less dangerous means, it is an undoubted duty to have recourse to them." That is, for every present impracticable labour we are to have recourse to the Cæsarian section; but for any future ones in the same woman, to the induction of premature labour. I perfectly agree with the reviewer, that for all cases of obstruction for which I have recommended craniotomy, and he the Cæsarian section, premature labour ought to be advised in subsequent pregnancies, and this doctrine he found in my book, if he read it. At the same time, I cannot but congratulate the profession on finding the Dublin Review an advocate for the induction of premature labour: it is a sign of progress very encouraging to us, for the reviewer must be aware that this conservative operation was first proposed by those Protestants, upon whose alleged disregard of infantile life he is so severe; and also that for years it was opposed in France, Italy, and Germany, by the Roman Catholic clergy. Even so late as 1827, M. Capuron, a distinguished and devout practitioner, characterized it as "Un attentat commis envers les lois divines et humaines."

Now let us consider the Cæsarian section as a substitute for craniotomy.

The reviewer bases his conclusions upon the statistics given in my book. The entire number stated is 423, of which 231 mothers were saved, and 192 lost, or about 1 in $2\frac{1}{3}$; of 238 children, 167 were saved, and 71 lost. Let me observe that, although I have collected this number, I am far from pledging myself to the trustworthiness of the persons by whom they were recorded. The incomplete account of the children also is a great drawback, as our statistics might be altered if we knew what became of the remainder.

If we inquire a little further, we find that M. Figueira has collected 790 cases, of which 424 were fatal to the mother, or considerably more than one-half, but say 50 per cent.

Again, Dr. Arneth mentions that M. Kayser collected and analysed 338 cases, of which 210 proved fatal to the mothers, or nearly 2 out of 3, but say 60 per cent.

Moreover, if we take the cases which have occurred in Great Britain and America alone, I find, out of 63 cases, 18 mothers were saved, and 45 lost, or nearly three-fourths, say 70 per cent. In 60 cases, where the result to the child is mentioned, 34 were saved, and 26 lost, or 1 in $2\frac{1}{3}$.

Thus we cannot in fairness take the more favourable statistics as a ground of our proceedings: we must either strike an average, or, where that is impossible, base our calculations upon the lowest. Now, according to Figueira, we shall lose more than one-half; according to Kayser, two-thirds; and according to British and American experience, nearly three-fourths; whilst of the children we may, under similar circumstances, possibly save one-half,—I say possibly, because, as the result to many of the children was not noted, it *may* as well be less as more.

Let us go a step further. It is well known that, of late years, the cases have been more carefully selected in these countries, and in many ways have been managed by *previous preparation* both of the patient herself and of suitable means and appliances, which require time and foreknowledge. To show this, take the cases that occurred in Great Britain and America before 1830: 35 such cases will be found in the Table I have given, of whom 30 died and only 5 recovered, or 1 in 7—*i.e.*, $\frac{6}{7}$ths, or 86 per cent. of the mothers were lost; more than one-half the children were saved.

So far, then, we find that a more minute analysis has not improved the mortality after this grave operation: we see that it varies from one-half to two-thirds, three-fourths, and six-sevenths of the mothers, and about one-half of the children: whilst we found that a careful examination of craniotomy reduced the mortality to 1 in 31. That is, you lose 1 mother in 31 after craniotomy, and all the children; but in the same number by the Cæsarian section, you would lose about 16, 20, 22, or 27 mothers, and save 16 children. Or, taking the lowest of these figures, and admitting for a moment the lives to be of equal value, out of 31 cases, or 62 lives, you save 30, which is exactly the number of lives that would be saved by craniotomy, if my calculations are right. If we take the higher numbers, the saving of life will be reduced respectively to 27, 25, and 20, in 62. And, moreover, we should not forget that, whereas craniotomy is an operation of *necessity*, not election, we shall have voluntarily *chosen* this operation, and have knowingly incurred this fearful destruction of mothers. To any person thus acting, the reviewer's words will cease to be ironically severe, and become simply descriptive. "And if we may sacrifice one life to save the other," he says, "if we may sacrifice the less important to save the more precious, we may of course occasionally kill the mother to save the child, because there are many circumstances in which the life of the latter is much more precious than that of the former."

After what I have said, I think we shall hardly be prepared to agree with the verdict of the reviewer, that if all the circumstances of both operations were compared impartially, "the advantages would remain on the side of the Cæsarian section, which is much the *easier and simpler of the two.*" Let us examine a little closer into this, as bearing upon practice. One *cause* of a high rate of mortality after the Cæsarian section is, that the patients have often been allowed to remain in labour too long before the operation. One *advantage* has been—and it is essential to success—that the operator has known some time previously that he would have to operate, and has had time in some degree to prepare his patient, to secure suitable assistants, and to get ready various matters which are sure to be required. The *danger* arises, first, from the shock of the operation; second, from hæmorrhage; third, and chiefly, from subsequent peritonitis; and this latter risk will be much increased by bad food, bad air, and bad nursing generally, but especially by the prevalence, at the time, of any epidemic.

Now, in substituting this operation for craniotomy, consider the circumstances in which we must almost necessarily be placed, and see whether they are favourable to success or not. They appear to me to combine every disadvantage of the cases of hysterotomy on record, with none of the advantage possessed by the operator in them.

In the first place, so formidable an operation will naturally be postponed to the latest possible moment, on account of its known danger, which will materially diminish the chances of both mother and child. Then, as it is quite impossible, in such cases as we have been considering, that the operator could anticipate its necessity, he will necessarily be unprovided with things requisite, and with assistants; nay, it may be night before he makes up his mind, and he may possibly be in the country, remote from all qualified assistance. Moreover, these cases are very much more frequent among the poor than those in comfortable circumstances, and here we have combined the drawbacks of bad air, bad food, and injudicious management, with possibly a prevalent epidemic.

Under these circumstances, what will be the probable mortality? You may unhesitatingly dismiss the hope of saving one-third, or one-fourth, or even one-seventh of the mothers, and half the children, but can you, with any reasonable certainty, calculate on saving one-twentieth of the mothers, and one-fourth of the children? and if not, look at the unfortunate position of the accoucheur,—he has *sacrificed* so many of the mothers to save so small a proportion of the children. May we not fairly characterize this as doing evil that good, and very little good, may arise, which *we* reprobate as strongly as the reviewer.

But allow me to add that, if we are to be guided solely by the desire of delivering a living child, at whatever expense to the mother, I do not see how we can limit the operation to the cases we have supposed—viz., mechanical disproportion. There are others in which we fail in saving the child by ordinary means, where it might indubitably be born alive by means of the Cæsarian section. Take, for example, a case of prolapse of the funis, which you fail in replacing, and where turning is impracticable, and the application of the forceps impossible; the labour being natural, the mother will be delivered without risk, but the child will be dead. Now in this case Cæsarian section would undoubtedly save the child, but *dare any one propose its adoption?* Yet the principle is the same, only pushed a little further.

The reviewer lays much mistaken stress upon the Cæsarian section being "simpler and easier," which he would not have done had his medical knowledge kept pace with his theological. In craniotomy, in the cases we have been considering, no wound or injury is inflicted upon the mother: a mutilated child is forcibly drawn through the passages, and that is all. In the Cæsarian section, on the other hand, the largest serous cavity in the body, and that by far the most sensitive to morbid action, is fully laid open, the uterus is divided, and there will be more or less hæmorrhage into the peritoneum. After the operation is over, there is every probability of an attack of peritonitis from the exposure and rough contact with the serous membrane, and this disease is one of the most fatal we ever meet in practice. It must be either ignorance or folly to compare the danger of the operative proceedings of craniotomy with those of the Cæsarian section, as regards the mother. And medical men are aware of and admit this. I know a little of foreign obstetric literature, but I cannot call to mind a single Roman Catholic writer of eminence who has recommended this substitution. I should at this moment be perfectly willing to abide by the decision of a jury of French or Austrian obstetricians of authority on this subject; and, however the question of craniotomy before the death of the child be decided, I can assure the reviewer that he will find no one in this country to take his advice about the Cæsarian section.* Any one who should venture to do so would, I have little doubt, find himself put upon his defence before the tribunals of his country, and in the hands of a jury who have wives, and value them.

Allow me to add a confirmation of the opinion I have expressed, in the words of Dr. West, no mean authority, it will be admitted :—"If, then," he says, "such and so many dangers beset this operation, while the causes of that mortality are, for the most part, beyond the power either of surgical dexterity or medical skill to obviate, and some of them inseparable from those processes which needs must follow delivery, we may, I think, feel satisfied that the general rule in British midwifery which prohibits the performance of the Cæsarian section, except where delivery would otherwise be altogether impossible, rests on a far sounder foundation than that of mere prejudice, or blind obedience to the dicta of men eminent in their profession.

I have now gone pretty fully into these important questions: I have shown that hastening the death of a child that cannot be born alive is not murder, as the reviewer has been pleased to term it, but, according to the law of morals, and the law of the land, justifiable and right. I have expressed my own faith in the safety of the child's soul when baptism is impossible, whether it die *in utero* or if destroyed. I have endeavoured to prove that the responsibility of the accoucheur for the child ceases when his power over it fails; but that, in the one essential particular, his responsibility for the mother does not cease, but rather augments, because that condition is within his own control. We have seen that craniotomy is not recommended for any case in which the child can be delivered alive, and that, although the mortality to the mothers is very high where assistance is deferred until the death of the child has taken place, it is comparatively small when afforded in reasonable time.

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* Since this remark was published I have seen the question put to the test. In a case of pelvic distortion where the forceps failed, the priest refused permission to perform craniotomy, and brought an accoucheur of his own choosing, who, he said, would deliver the woman without injuring the child. He tried the forceps and failed, and then the original attendant offered to give up the patient to him for the Cæsarian section if he would take the responsibility. This he declined, and they sent the woman to the Rotundo Hospital, where she was delivered by craniotomy.

As to the alternative of the Cæsarian section, I hope I have convinced you that, whatever be its mortality, when deliberately planned and arranged beforehand, with assistants and all the various appliances necessary, yet that, hurriedly performed, with the patient exhausted by prolonged sufferings, and the operator deprived of the advantages of due preparation, the mortality must inevitably be so fearfully high, whilst the number of children saved would be so small, that were we prepared, as the reviewer is, to sacrifice so many mothers in our endeavour to save the children, the sum total of lives saved would, at the best, not be more, but might very probably be much less, than by the operation of craniotomy.

There are two or three other points of secondary importance upon which I should like to say a few words, if I have not exhausted your patience. The reviewer states that I mention, as one of the objects of the Cæsarian section, "the extraction of the child so promptly as to give it a chance of life when the death of the mother has taken place suddenly;" and he adds, in a tone of blame—"But he never again reverts to the subject, so far as we have been able to discover: and indeed, the teaching of professors of midwifery in these countries has led to the horrible practice of leaving the living child in the womb of its dead mother. *A great many cases have fallen within our own observation* in which the woman has reached the end of her pregnancy, where the death was sudden, and it was morally certain that the child was alive, and yet it was left in the dead mother's womb, and buried remorselessly along with her."

The quotation from my work proves, on his own showing, that the allegation against the teachers of midwifery does not apply to all; and, from what I know of my fellow-professors, I do not think that it is true of any. I believe most firmly that far less than being "*morally certain* that the child was alive" would induce every teacher and practitioner to give the child the chance of life: and I regret to see in the pages of the Dublin Review what I cannot but believe to be an unfounded slander.

But the reviewer has seen "a great many" such cases of sudden death, &c. Now as he has had free use of my statistics, I call upon him to give me the benefit of his, and to say *how many* he has seen, and *under what circumstances.* I am unwilling to say an uncourteous word of any one, but I must frankly confess that I do not believe this assertion. Sudden deaths at the end of pregnancy, or in the last two months, are very rare; the majority result from accidents, hæmorrhage, rupture of the uterus, cerebral affections, or acute disease affecting other organs. Dr. M'Clintock informs me that in the seven years he has been Assistant and Master in this Hospital, he has seen but two cases of death during pregnancy.

I myself have seen two or three women (in consultation or dispensary practice) die undelivered from hæmorrhage, and two from rupture of the uterus, but no others, in thirty-four years' practice. Now, in the two latter classes of cases, the operation would be useless, for hæmorrhage sufficient to kill the mother would undoubtedly destroy the child; and Dr. M'Clintock has established the fact that the child dies almost instantly after rupture has occurred. I never saw a woman die of convulsions or apoplexy before delivery; but we know that in such cases, when the life of the mother is preserved, the child is often born dead, and I think it very unlikely that it would survive the mother's death. At any rate, the stethoscope would test this, as well as in death from acute diseases; and if the fœtal heart were heard, I think it would be the duty of the medical man to propose the operation; it is clear that the decision does not rest with him. In case of accidental death from violence, I believe every one is prepared to try and save the child, and the probabilities are much more in its favour than in any of the other cases; yet the reviewer ought to know, that of all the cases of this kind on record, in a large majority the child has been found dead.

I cannot help remarking here that, not only in what relates to this question, but to all those he touches upon, the reviewer altogether ignores the husband and father, as necessary to be consulted, or having a voice in the decision. Whether the child is to be destroyed, or whether we are to wait until it dies, to the peril of the mother, or whether she is to be opened the moment she is dead, is to be decided by the clergyman or the doctor, but apparently without reference to the person most deeply interested! And yet he has not only the natural right of his relationship, but legal power; for Dr. Lever recently mentioned that he had consulted Dr. Alfred Taylor to know "whether he would be justified in performing this operation without the consent of the father, as it appeared unjustifiable homicide to allow the infant to die?" Dr. Alfred Taylor gave his opinion that, in law, the infant belonged to the father—the infant, "with the life thereof;" and that if Dr. Lever touched it, even to rescue it from death, an action would lie against him. The father in two cases had refused Dr. Lever permission; and in this country, although there is a strong feeling against burying the child in the womb of its mother (a distortion, probably, of the true view), yet I have known permission to extract it refused till it was altogether too late. I confess that, although wrong, one can make much allowance for the feeling which objects to the mutilation (as it would appear) of a wife, instantly after death, and in fact before the husband had been able to realize his loss.

The "moral certainty" of the reviewer seems to me very easily acquired, if he believe all the stories he quotes from M. Debreyne of children delivered alive by the Cæsarian section, after five, twenty-four, forty-eight hours, and three days, or even after the interment of the mother. It would take us too long to examine into the evidence of such miraculous cases, and I, for one, object to take them on M. Debreyne's authority.

Again, the reviewer "reprobates in the strongest terms the language of Dr. Churchill, who confounds the induction of premature labour with the procuring of abortion." Begging the critic's pardon, I do no such thing; I couple the two together, certainly, but they were obviously intended to apply to different cases. If, when the reviewer was so shocked with the paragraph in the chapter on Cæsarian section which he quotes, he had turned to the chapter on induction of premature labour, where the details are given, he would have read thus: "In the cases I have supposed, the safety of the child is the great object of the operation; and they are limited, therefore, to those patients in whom the pelvis, though deformed, is still large enough to permit the passage of a *viable* child. But there are cases where the *distortion is so great as to render the passage of a seven months' child impossible;* and others still worse, *where no reduction of the child's bulk will enable it to pass.* I do not see why abortion should not be induced at an early period in such cases. The life of the child must inevitably be sacrificed, and the safety of the mother alone regarded; and surely, after the calculations I have adduced, it cannot be pretended that Cæsarian section, the *alternative* in these cases, offers such a chance to mother and child as would justify our preferring it." I am sorry that the reviewer should have wasted so much virtuous indignation, but it is his own fault. I did not, and do not, propose the induction of abortion as a substitute for premature labour, but in cases in which premature labour, when the child is viable, would be of no use. In those very rare cases of extreme distortion, or after the patient has recovered from tho Cæsarian section performed for extreme distortion, I do say that, to save the mother from the excessive risk of the latter operation by one from which she runs no risk, would be more justifiable and better practice than to allow her to go to the full term. The reasons I have already so fully given apply equally to these cases, so that I need not enter into them again. I do not believe that we endanger the soul of the child; and I have no doubt that the mother's safety will be more fully insured than by any other mode of treatment.

Let me add that of which the reviewer seems ignorant, that the operation was proposed in such cases by Dr. W. Hunter in 1768, and that on the Continent it has been sanctioned by such men as Foderé, Marc, Velpeau, Stolz, Jacquemier, Chailly, Cazeaux, Spiegelberg, Scanzoni, &c.

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